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This conference report describes the use of the Edison Responsive Environment (ERE), a "talking typewriter" based on some of the work of O.K. Moore. Conferees were various educators and officials of the Responsive Environment Corporation. Panel discussions and speeches describe the field use of the ERE in several educational settings including remedial language arts programs and programs designed for autistic children, culturally disadvantaged children, and retarded readers of normal intelligence. While most of the reports make reference to comparative research design, no analysis of data is presented, because many of the projects were still in progress at the time of the conference. Some discussion of learning theory and programing theory is included. (WB)

CONFERENCE REPORT

Responsive Environment Learning Centers
"Feedback From The Field"

February 8, 9, 10, 1968

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REC

RESPONSIVE ENVIRONMENTS CORPORATION

ENGLEWOOD CLIFFS, NEW JERSEY 07632

AUG 2 6 1968

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REC SYMPOSIUM

RESPONSIVE ENVIRONMENT LEARNING CENTERS,

"FEEDBACK FROM THE FIELD"

February 8, 9, 10, 1968

THURSDAY - OPENING SESSION

Chairman: Dr. John Henry Martin, Senior Vice President, REC

Chairman: Welcome to our very first assemblage of the users of the ERE. At this time I would like to introduce the man who pioneered the Edison "Talking Typewriter" with more than inventiveness - with cash, in the days when it was a long way away from being anything except a dream, with no commercial possibilities. Our vigorous and determined young president - I've forgotten his name - we sit in each other's laps, and as I age and grow in weight the burden on him increases. Mr. Spector.

Myles S. Spector: I've had some unusual introductions, but I guess that's about the most. But John is noted for the most. Thank you, John.

I'd like to officially welcome all of you to this, the first meeting, of what we hope will be many such meetings of a "Talking Typewriter Users' Group". I'm particularly pleased to see some old faces, old friends here, whose association with the "Talking Typewriter", REC, goes back and is measured in years. I am delighted too, to see a lot of faces that I don't know, whose association is measured in weeks and in some cases, months.

We have here representatives of projects from as far away as California and London, with a number of people from parts in between. Among you, you will find representatives of REC - staff members, as well as representatives and staff members from the Thomas A. Edison Industries Laboratories. I'd like to take a moment here to tell you that because your interest, the interest of people you work with and what little we at REC were able to accomplish so far, the McGraw Edison Company at the beginning of the year, changed the status of the Thomas A. Edison

Laboratory from a Department to an operating division of the company, and in recognition of Richard Kobler's contribution, made him a vice president.

This, of course, gave us a great deal of pleasure, but I think is also indicative of their corporate commitment to continue their research development and service facilities in the field to make this truly an industry, not merely a research tool.

We hope that as a result of this meeting, you'll get to know us better; we'll get to know you better, get to know your problems better, and that this will be the beginning of an interchange of information. REC is the distribution point for that information, but it can certainly be done on a bi-lateral basis among projects in the field. We hope, as a result of this also, we'll be able to do a better job of helping you and thus truly in our desire, with the end result that many children will benefit from our efforts.

Thank you very much. I hope the conference is a very successful one for you, and I will be seeing you from time to time during the proceedings.

Chairman: We are a strange company. We take very, very seriously our involvement in education to make us a different kind of company. Mr. Spector and I in reviewing projected budgets during the past weeks, came to the rather startling conclusion that in our expenditures for this coming year, REC will be spending more in education involvement, meaning a cost outlay for education, than all other commercial and business activities of the company combined. This, I think, is a rather unique situation, particularly as we are a long way from being a large company with a large profit position.

Some of you are aware of the fact that in recent months we have established a Customer "upper" Division, sending our people out in the field to assist you, in a consultant relationship completely under your direction. Some of you are aware of the fact that we have developed the only software - as the industry calls it - for technology that exists despite the position of the electronic giants in the field of computer assisted instruction.

Some of you are doing extraordinarily creative work in development of your own software. We have the largest number of installations of all the other electronic companies combined. We are in more diversified fields of education, from special education to the full range of academic. This is a rather unique position when you consider that the big trade names, the large [illegible] buildings of the electronic industry are entering in this field and they're a long way from the level of operational position that we already occupy, thanks to you.

And so this meeting here today of some twenty-five different installations, from London to California, and the Eastern Seaboard and the Midwest, gives us a great deal of satisfaction. We brought you together to ask you to tell us, or to tell each other, the kinds of progress that you're making and the kinds of difficulties that you are encountering. Essentially our staff members are here to listen, to take down, to convert your needs into what we can do in added service to you.

I would like to introduce a couple of our officers who are present: Mr. [illegible], Vice-President from the West Coast office; Mr. [illegible], who is Executive Vice-President from our Washington office. As you can see from the [illegible] that he has, he's the oldest employee of the company, both in time and in years. We haven't yet [illegible] his [illegible], and I'm well into my [illegible], but nevertheless, if you watch the two of us perform, you will see that chronology has nothing to do with age. We have a rule in the company that nobody under forty-five should try to keep up with the Senior Vice-President. And the term Senior, you see, has nothing to do with my functions; it has to do with recognition of my age.

I should ask Mr. [illegible], who is our National Sales Manager for the Eastern half of the United States, to speak, at this time.

PANEL: DESIGNING AND OPERATING LANGUAGE LABS'

Chairman: May I ask the panel, Mr. [illegible], Mr. [illegible], Mr. [illegible], Mr. [illegible] and Mr. [illegible] to come forward. Our panel this morning consists of the people who worked here, who will cover various aspects of the 'Designing and Operating Language Labs'.

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Given the orientation of our work, I'd like now to discuss the strengths and limitations of the ERE instrument. First, the ERE has served us well. The effectiveness of our research depends on being able to provide each child with the same, exactly the same, set of instructional events. If one is concerned with reproducible results, one must have reproducible events. When we insert the card and the set of slides in the machine, we can count, most of the time, on different children, on different days, experiencing exactly the same set of stimulus and response events. The importance of being able to count on this cannot be overstated. In no situations in which teachers are used for instructional research, can you count on this consistency in experimental conditions. This is not to say that we believe that all instruction ought to be . carried out in the manner in which we are researching, but rather that being able to count on such specification and control makes for powerful research relevant to issues of instruction and individual differences.

As an instructional instrument, the ERE offers considerable flexibility. Joe McSweeney and Ellie Richardson have exploited that flexibility in some very unique ways, a point which I will get back to at the end of my remarks. Another important strength of the instrument is that it is easy to encode, which is not true of all pieces of equipment. Especially when you are involved in creating lessons and revising them, this capability is extremely important. If you consider the problems involved in revising a record for a phonograph, you can understand the value of the ease of lesson revision with the ERE instrument.

[illegible], what are some of the limitations? Given our orientation, there are three major limitations. One of these is built into what the instrument is, an automated typewriter. As programmers, this means that button presses stand for letters. In modifying the keyboard, we have made button presses stand for pairs of letters or words. However, button presses do not stand for pictures or auditory events. In that the machine is built around the typewriter, the researcher and programmer is, in part, programmed by that piece of equipment.

The second limitation is that the machine doesn't provide an ongoing record of the responses made, both correct and incorrect, and response latencies. These are limitations from the point of view of our research interests. For us, it would be valuable not to have to have someone looking through the one-way vision window to keep an ongoing record of these kinds of events. This is not to say that observation would be irrelevant even if automatic recording was available. The major point is that it would increase accuracy of data collection as well as lead to much less expensive and quicker treatment of data.

The third limitation is that the machine does not branch. That is, the machine does not provide the possibility of differential feedback in relation to responses. The machine does not provide the possibility of automatic branching on the basis of errors.

In regard to these limitations, I wish to reiterate that our definition of limitations extends from our research and programming concerns. The researcher or programmer need select equipment whose inner circuitry is compatible with his interests, requirements, and style. Each piece of equipment places certain parameters on the person working with it. On the other hand, each piece of equipment takes on the character and personality of the persons programming.

During the past three years, Joe McSweeney and Ellis Richardson have "lived" with the ERE instrument. As a member of the family, I observed that relationship. As in any such relationship there have been tense times. However, those persons who have seen and used their progeny (lessons), recognize the quality of their offspring.

The challenge of the kind of equipment that electronic technology is offering education still is the challenge of the software, the progeny of man and complex technology.

Chairman: Thank you, Larry. Our next panelist is Dr. Doreen Steg, Associate Professor and Chairman of the Department of Human Behavior Environment at Drexel Institute of Technology in Philadelphia. She is consultant of Program Development for Special Public Schools in the city of Philadelphia. She has published many works, the latest being Contemporary Problems in Education. That should be voluminous. Her research studies include the Sophistication of Syn-Tactical Structure in Young Children. Her research in home economics training and is preparing adult women for employment in this field.

She's serving as Director of the ERE project at Drexel, and I'm pleased to introduce Dr. Steg, who will speak on "The ERE and the Education Profession".

Dr. Doreen Steg: As, of late, "teaching machines" have been put to use in "normal" and "abnormal" teaching situations, and a wealth of opinionated data has been published on the subject of learning process. Many have maintained that the impact of "Educational Technology" and its effectiveness in "training", as contrasted to "pure education" has been clearly demonstrated.

It thus seems appropriate to attempt an outline of the system involved in the learning phenomenon and the distinction between training and education. Training involves the learning of some specific pattern of behavior, be it equilibrium on a tight rope or chess playing, etc..., while education concerns the development of new, not previously learned behavior.

Thus, in every field of human endeavor, education would lead to accomplishments beyond the learned patterns. The result of education is creativity, while the result of training is performance involving skill and not necessarily creativity.

What brings into focus this difference, could be illustrated by the example of a trained "specialist" able to make a copy of a Vermeer which is hard to distinguish from the original. Whether it is in the field of painting or literature, or music, a masterwork can be recognized by the individual master's style. A work by Rubens, Borodin, or Hemingway is traceable to the author by the average layman, provided he had some basic training in the particular field. The training involved would be a training to paint, compose music or write literary composition. While this kind of training necessarily requires a teacher or teaching machines, even selftaught training is predicated on the assimilation of some previous experience. Creative activity goes beyond previous experience while assimilation of previous experience is the expected result of training.

Cybernetic Control and Reinforcement Control - The principle of feedback-control was recognized by training psychologists better than 25 years ago. However, its introduction as a formal behavioral concept dates back to 1948, when Wiener published his book on "Cybernetics". Wiener's term cybernetics, derived from the Greek "Kybernetes", a word meaning "steersman", called attention to the study of human control mechanism and the principle of feedback control.

"Feedback-control visualizes an elementary system of control by which the sensing elements of an organism can obtain information and feed it back internally for guidance of its operative motor nerve centers. Such feedback is a commonplace of the physiologist long before the engineer found common ground with him in "cybernetics" This principle of steermanship by feedback has undoubtedly played a very important evolutionary role in animal life. Possibly even before life appeared.

Feedback mechanisms are characterized by the use of the measurement of some physical quantity to control a motor mechanism that in turn adjusts the magnitude of the measured quantity to bring it to a predetermined desired value.

Behavioral scientists have indicated a rather widespread acceptance of the principle of feedback. However, feedback and knowledge of results is used synonymously, and knowledge or results is thought to function as reqard as well as information. One can thus see why many theorists took the term feedback to mean reinforcement.

In this kind of analogy the feedback signal is interpreted as having reinforcing properties. And the smaller the magnitude of the error, the greater the reinforcement value of the signal. It is understood then that the response that minimizes error is presumably strengthened or learned.

In the "Physchological Abstracts" feedback is indexed thus: "See also knowledge of results, Reinforcement".

It is crucial, however, to delineate clearly the difference between sensory feedback and the feedback concept of knowledge of results or reinforcements.

Experimentally, one can observe that providing knowledge of results rather than reducing or withholding knowledge, does lead to more effective learning. And, it is true that immediate knowledge is more effective than delayed knowledge. But, this does not automatically enhance efficiency of performance and learning. Yet, it is generally assumed that learning can be enhanced if it is followed by reinforcement.

Assuming that, as with the laws of physics, the laws governing control systems apply equally to animal, man, or machine, we can follow the control theory application to training. In the language of the systems engineer, closed-loop control system pattern consists of:

1. An input signal that triggers some action;
2. A feedback signal of the result of this action to compare with the input signal;
3. A closing of the loop, a summation of the two signals, and
4. Effective action to counteract this new signal.

In a control system, action is triggered as a result of an actual error input (doubt, disturbance). The error is essential to the activity of any control system. These control patterns apply equally to automatic machinery, animal behavior and man's everyday automatic activity.

Transformation of Control - A theory of behavior organizations should enable us to conceptualize an orderly progression from relatively simple overt response patterns seen in very young children (as well as animals) to the complicated skills, symbolic responses, and other abstract thinking that an individual can exhibit. These human processes can be analysed in terms of systematic transformations of sensory-feedback patterns. Implicitly this denies the general validity of association and reinforcement models.

What appears to be different types of thinking may actually be considered as differences in patterns of feedback control. There are no distinctive categories in learning except in a general descriptive sense.

Verbal learning and instrumental learning differ because of the systematic transformation of closed-loop regulation of behavior are different in these two areas.

Instrumental learning and unaided psychomotor learning differ since the use of tools and machines involves spatial, temporal and kinetic transformations of feedback. This in turn changes the pattern of control. Psychomotor learning incorporates the feedback mechanisms of manipulative movements.

Orientation learning involves integration of the larger transport and postural movements of the body into a more general pattern of control.

Classical conditioning differs from orientation learning because the subjects are restrained and deprived of much of the varied sensory feedback used in normal adaptive responses. Cybernetic research in learning may well provide a framework for understanding and studying a variety of learning patterns.

There have been numerous attempts in military research programs, to systematize the planning procedures in training and operational research. Attempts at classification of training objectives or functions, as well as in classifying characteristics of effective training media, and the training media themselves have been undertaken.

However, it has been said that these schemes are hampered by the lack of a generally accepted means of specifying the critical features of behavior patterns.

By means of surveys and other data, Fitts, for instance, describes skill learning as involving phases of cognition, fixation, and automation.

Dynamic sensory feedback provides an intrinsic means of regulating motion in relation to the environment.

Knowledge of results given after a response is a static after effect which may give information about accuracy, but does not give dynamic regulating stimuli.

Dynamic feedback indication of error is more effective in performance and learning that static knowledge of results.

The efficacy of reinforcement assumes an active need or drive state.

Feedback theory assumes that the organism is built as an action system and thus energizes itself. Body needs are satisfied by behavior that is structured primarily according to perceptual organizational mechanisms, hence require program that communicates.

Feedback theory accounts for a variety of behaviors (from relatively simple overt and symbolic skills).

Systematic transformations of sensory-feedback patterns are effected by use of tools, symbols, socio-psychological, economic and other systems.

Opposed to this, reinforcement theory describes learning as due to the effects of reinforcements that bear no systematic relation to the different kinds of behavior learned.

Use of linear programs (including branching) in teaching *deliberately limits the media of communication*, the *experiences of the student* and *thus the depth of understanding* that *he achieves*. We suggest that instead the student be provided with a broad context of experience by resorting to all of the activities and to all of the communicative media at our disposal. This includes verbal and non-verbal material. Thus the student learns by responding to the perceptual organization of his environment.

Teaching - Learning Systems and Communication - In communication there are at least two different systems that can be involved. There can be communication with a person or communication without a person, or rather, communication by means of a third party, an object. It need hardly be emphasized that communication through objects is different than communication with a person.

People to people relations - Up to now education and training has been dependent on relations between people. Usually a child learns by being in communication with another person, be it another child, or an adult. This is the dimension of the field up to the present.

People to objects relations - In the case of communication through objects, there is a direct relationship between the individual and the object. Such a system is different from the one in which there is direct contact between people. *As a result, the field of teaching systems, is just that much enlarged*, although interrelations between people and objects are all subject to the person to person relations.

We are now entering a new dimension, a new era, as it were, a dimension where the relation involved is people to objects.

Teaching - All of the teaching is about:

1. science (object to object relations)
2. applied science (person to object relation)
3. humanities (person to person relation)

Person to person relation is common to all teaching be it between pupil and teacher or parent and child, and so on. However, in machine teaching-learning (pupil and object) there is now a different system involved.

I am suggesting that a new continent has been discovered, a new dimension, a new era.

There probably are other areas that will come up, but this one has a place for the machine. It is needless to worry about the competition this may present with the other system. An airplane does not interfere with walking.

Furthermore, let me suggest that this machine, the ERE, should be used at an early age. It is best suited for use at that time, since it is then that all systems of communication can be used or yet, can be developed.

To go back to the airplane: one should use it for rather long distances and not to cross a ten foot wide street. If one uses the ERE later it is much harder to do it and it has severe limitations. Think for instance about what one would try to teach Einstein with it or even Romney.

(Person-Object) relation is as essential as (Person-Person) relation. People to people relations work best when they share similar experiences. People to people contact is basically inhibited by different educational backgrounds, inhibited by the fact that people have not had similar past experiences. However, if both had people-object relationships, and share some experiences then education (people-to-people relation) becomes easier to achieve.

Social and responsive environments: The social environment is a matter of give and take, but relations between (Person-Object) is not. It is argued that a child who has not yet established a (Person-Person) relation, runs the risk of establishing only a (Person-Object) relation and may remain satisfied with that. But it may well be that it is the other way around. A person may be able to be involved in a (Person-Object) system, the non-give-and-take system. A person who has been able to establish a system relation with objects, has thus learned that there is a certain affinity possible with the outside world. (i.e., relation between (Person-Object)). Then, the next possible step may be when one of the objects in the outside world is--a person.

It is thus possible that a relation which does not have a give and take to it may soon change into one that does have give and take. Of the forty children that were involved last year in a pilot program ([illegible] and [illegible] tuition paying children) several of these children were successfully involved in the REP program although we could not get them involved in a non-automated program. Also the teachers in the center were mostly [illegible], suggesting reasons to [illegible]. Longitudinal case studies form the backbone of our evaluation and we are presently writing up some of the specifics.

Chairman: I take personal pride in introducing Dr. Benjamin Israel who is the Director of the New York City Project, incidentally the largest program in educational technology that exists in the country. My last count of the numbers involved was in the area of 700 people a day flowing through and having consequences happen to them at this Brooklyn Center for the Responsive Environment Program under the auspices of the New York City Board of Education.

Dr. Israel is a former elementary school principal in the City of New York. He has lectured at universities and taught at the University of Minnesota. Dr. Israel

Dr. Benjamin Israel: Thank you, John. First, if you counted 700 you counted me twice. It's just a shade under 700, but I'll tell you more about that later.

In listening to Dr. Gray and to Larry [illegible], for some reason or other there was some connection that took me back to a college course about 30 years ago: a philosophy course, if you will, in which the primary purpose was to define rather succinctly the differences between a realist, an idealist, and a pragmatist. And it was boiled down to a very simple pattern: the realist says, "This is a rock"; the idealist says, "I think this is a rock"; and the pragmatist throws it.

I find myself in a similar position. My orientation is not as theoretical as Larry [illegible]'s. It is not as philosophical or as psychological as Dr. Gray's, but it is very much more pragmatic for several reasons. Ours is not a research project in the broad sense; it is rather a demonstration project, a demonstration program, and in it I wear three hats. I wear one, which during the day from nine to three, is lent to me by the Board of Education to test the efficiency of this type of technology within the parameters of an urban school system; an urban school system, if you will, beset by many problems.

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if when you see our library tomorrow, you see several copies of "Manchild in the Promised Land". Don't be too surprised if you see other books, some of which may be considered controversial; but they are highly motivational because they deal with living as it is and life as it is for the youngsters in this area.

You have heard, of course, that when you're dealing with both young children and teenagers from disadvantaged areas, that they are non-verbal, inarticulate, non-communicative. Don't believe it. They are, if you stand there with a pad and pencil trying to write down everything they say. They are not, if left to their own devices, if given some freedom of expression and choice.

Panner, came up with a program that had a tremendous impact. We had a youngster whom we came across who didn't have the time to come to the Center because he had to stay home and practice his jazz. He was a jazz musician, and that was the most meaningful thing in his life. Dave came up with an idea of combining a recording with some material that would be highly motivational; and this material "grabbed" this kid so that we were able to wean him away from his primary interest into the kinds of things that were necessary for the acquisition and development of a skill necessary for success in reading.

A very simple program. Ingenious, if you will. The minute this kid sat down in a booth, out came Herb Albert and the Tiajuana Brass loud and strong. This is enough to 'grab' any kid. It was so rhythmic in its impact that I defy anyone to hold still for it when it comes through. And suddenly the program stops and says, "The sound you heard was that of a trumpet. I will call out the letters in the word trumpet. Find these letters." And there it goes. And the student does. Then there are the bongos or the piano, or whatever else happens to come through.

Well, this is a 'grabber', and it grabbed this fellow. For the first time many of the youngsters who were in we are dealing with feel that they are in control of the situation. They can work at a pace they choose to work at. The value judgments that many of the teachers have offered, sometimes not even realizing they're doing it, do not come through. The patience is there, if we use the kinds of material that are of interest to them, and if we can vary these materials, we're in good shape.

But we ran into trouble. And so we sat up a flare in Brooklyn which was seen in Englewood Cliffs, New Jersey, and REC came to our assistance again. Because those of you who have some familiarity with a large scale operation (not one or two typewriters) can understand that the insatiable appetite of the Talking Typewriter requires programs in tremendous volume and quantity.

We had to have them, we had to have them fast, and we couldn't develop them quickly enough: a steady "diet" of high interest, low ability programs will not provide the kind of skill development that is absolutely essential, if the youngsters are to come out reading better than they were when they went in. Dr. Katz of REC and others there - certainly Dr. Martin, was very much involved. He spent a lot of time with us. He made arrangements for us to get the Sullivan materials. These are programmed. These are patterns that are - well, we were using them six months before Chall came out with her book and insisted that this was the way to do it. And it has worked. The only thing is that we have found that there are certain limitations to the use of Sullivan. You're dealing with teenagers, you see, and a steady diet of this thing is somewhat difficult.

To say that you can use Sullivan materials five days a week for a 20 minute session and expect the youngster to come back on the sixth day I think is stretching things just a little bit. So what we've had to do, you see, is use these high interest stories and use other materials and space them so that there would be perhaps a day or two of Sullivan materials and then a day or two of a story which would apply those learnings which came through from the Sulliva lessons the previous day.

And certain patterns had to be developed so that in the pre-test we would be able to determine just about where we should plug the youngster in, because to start all of our kids at the beginning series and work our way up would be wasteful in terms of time, and might very well kill whatever interest was there. So this, too, was part of the experience that we had to go through.

I mentioned to someone at the office this morning - had to stop for something - a particular youngster's name was brought up; to be specific, it was Angel. This is one of the roughest, toughest customers I've come across in 17 years of school experience. A Spanish speaking boy, quite belligerent, overt and almost hostile in virtually all of his interactions with adults. It was a slow process. He started with us last year. The point I'm trying to make is that just before the Christmas vacation the teachers who come to the center with the youngsters decided that they would like to have a party for these high schoolers. And they did.

There's a little pizza place downstairs that you'll see when you come to see us tomorrow. They ordered pizzas, and sodas; and they had records, and the girls and the boys were dancing. We were moving about taking pictures with the Polaroid camera of everybody in sight; and everybody seemed having a wonderful time. But I didn't see Angel. He's very much the ladies' man, Angel is, and I was sure he'd be very much involved in the middle of this party.

He wasn't anywhere to be seen. He walked in about 20 minutes after the party had started. When I asked him where he had been he said that he had been in the laboratory in one of the booths because there was a lesson he had started the previous day, and he felt he would like to "wrap this one up before the vacation" because he wouldn't be coming back for about ten days or two weeks.

I can tell you of other situations in which youngsters have missed the bus, and I tell you that the school that we bring these kids from is a mile away. they have taken the trouble to run the mile, not to miss their session. I can tell you of other situations; we checked the youngsters' attendance from September to January before we opened the project. We found that they were absent 60 days, 70 days, 90 days during the course of one term. Then we checked their attendance records from February to June, and we found that during the same span of days they were absent four days, six days, seven days. We would like to take some of the credit for it.

I honestly think we can, or the typewriter can, or the climate or the kind of attitude or atmosphere that we have there can. I can tell you one other thing which sounds negative but which is very positive. I told you that we get 400 books a month on a rotating basis. We have never been able to return 400 books. The youngsters are "taking" books. I tell you, this is one of the most positive signs you can possibly imagine in this area. I mean this, sincerely. The library doesn't care and I don't care. In the minds of many youngsters at this age level, there is such a feeling of anti-intellectualism that in many cases, to be seen with a book is almost - well, I wouldn't say humiliating, but the reaction of peers who see you with the book will not be a positive one. Oh, we get them back, if we fight for them. But I can tell you it's quite a sight to see the youngsters, many of whom haven't touched a book for years, who have been through every single remedial program you can imagine from the third or fourth grade up, taking to this; behaving in a manner which is completely different from the way in which they behave at their regular schools when they go back.

There have been changes in attitudes, changes in patterns, changes in dress, changes in many things and many areas. All of these seem to be a reflection of the success experiences they encounter at our center. When you see the center you will be somewhat surprised that it doesn't resemble a school in any manner, way, shape, or form. If it looks something to you like the Chase Manhattan Bank, don't be too surprises; the same designers who developed the color scheme at the Chase Manhattan Bank worked with us. Not on Federal money, incidentally.

One of the reasons for this was the involvement with an adult population. If we had had something very much resembling a school, it is quite possible that we would not have had the degree of adult participation that we enjoy at this time. We are dealing with people who have been rejected by the schools and who have rejected schools; who, psychologically, have a sense of "not having made it" once or twice in a school situation would have created, we believe, a psychological block. Nothing like that occurs here to our knowledge.

I've tried to give you some picture of the involvement with our teenagers. This is during the regular school day. We have a good many of them who come in in the late afternoon and evening. They appear to reflect the very same types of attitudes that I've tried to picture for you. Tomorrow, at an orientation session, and after your viewing of many of these youngsters, and a briefing by members of my staff, you'll have the opportunity to ask questions. You will get, as those of you have already visited the Center may know, legitimate and truthful answers to the extent that we can give them to you.

There are many answers we have not come up with as yet. But if I've whetted your appetite somewhat for the trip tomorrow, and if I've given you some indications of how we deal with the teenagers in terms of individualized programs, then I've done what I was brought here to do. Fourteen and a half minutes, Dr. Martin. Thank you.

Chairman: Thank you, Ben. Mr. Louis Scott runs a rather unusual program. An employee of the Cook County Department of Public Assistance, he was employed by a man that I got to know just in the year or two before he died, a man who had previously been Commissioner of Public Aid in the City of New York; who went from that position to a similar one with a different title in Chicago, Illinois. Ray Hilliard pioneered the concept of the closed loop cycle of poverty. As he described it, impoverished premature mothers gave birth to, and raised in a cycle of poverty the next generation, doomed and destined by that environment to repeat the pattern of their parents. He told me during my first meeting with Mr. Scott, that he was dealing with the third and fourth generation of families, none of whom had been gainfully employed in those several generations of time, incidentally encompassed in less than 40 years.

And some five years ago, Ray Hilliard said he was interested in early childhood education because, as a pragmatist and from empirical evidence, unless he could intrude something into the environment of infant children, the subsequent history of all other interventions, called schools and welfare assistance, were going to do more than confirm a kind of Calvanistic poverty foreordained and predestined to a continuation. And he selected Lou Scott at that time to investigate what could be done through the instrument known as the "Talking Typewriter", and the present program came into being under Lou Scott's direction and leadership.

I'd like him to talk to you in terms of their observations of the role of this kind of an education in the matrix of a welfare program. Mr. Scott.

Mr. Louis Scott: Thank you. I feel that I owe a deep debt of gratitude to Dr. Israel for taking me off the hook just a little bit, because after listening to the first two speakers I became increasingly happy that the subject delegated to me would enable me to avoid a demonstration of my severe lack of knowledge in the field of technology. I was very worried there for a few moments.

My subject is: Role of the Public Aid Agency in ERE Programs. And that was the one agreed upon. I think if I could rename that I would do it, and I would probably say, "What the Hell is the Cook County Department of Public Aid Doing in the Field of Education?" This we have to answer quite frequently. It has been explained to you by Dr. Martin why we're in this. It all does come back to a man of vision that we had in the Cook County Department of Public Aid, for many, many years, Raymond N. Hilliard. About 15 years ago he sponsored programs which involved special training and education of teenagers and adults, the hard core unemployed. And all of these had a measure of basic literacy, basic education, woven into them.

He was a leader in this field. He was an independent. He was powerful enough to continue doing these things in spite of criticism leveled against him; largely for personal reasons. These programs have since disappeared. Raymond Hilliard died on July 4th of 1966. He got up just long enough to say something and then died. And I'd like to feel that he exerted this last little bit of independence on that day of Independence.

It might be interesting for you to know that originally, after we discussed the need for education of disadvantaged pre-school children, Ray sent a team to Freeport, Long Island to a project sponsored and presided over by Dr. Martin, and they came back with glowing reports. One of these happens to be Dr. Deton Brooks who is now the head of the War on Poverty programs in Chicago. Then I wrote a proposal and took it to New York to private foundations, much to the interest and encouragement of Mr. Norman Kreisman who was then in the New York office of the REC. I got the usual shutting of doors and the usual excuses and the - "too bad, the budget has just been approved for the next year", and these sorts of excuses.

But one company was very interested, one corporation, Carnegie, and suggested that I then explore the more obvious source of money for these things at that moment - people who were throwing it around like mad. That would be the government agencies. So we went to Washington and started with HEW. After about six months they determined it didn't properly belong in their particular area, so we gravitated to the Office of Economic Opportunity. And after seven months of panel meetings where we had sociologists and professors and laymen and lawmen and lobbyists and various other people, I took the proposal that I had originally written myself back to Chicago and gave it to our Research Department, asking them to make it a little bit harder to understand, substituting words like sibling for children and peripheral for neighboring, and so on.

I then took the proposal back to Washington and after another series of these very interesting meetings, the panelists began referring to me as "Dr." Scott. I then knew that we were on the right track and probably might come up with something in the very near future. Eventually we did. Our program in Chicago of course involves only pre-schoolers - severely disadvantaged pre-school children - in the bracket that was mentioned by Dr. Steg, two and a half to five years of age, most of them not over four because of the need for having to enlist in kindergarten classes after September the first if they're five at that time.

We've had about a year's experience with the program now. Our research design, too, as Dr. Israel's, conforms to specifications laid down by the Office of Economic Opportunity which apparently suddenly is not to their liking. But that's another story. We have followed it and added more. We've added a family functioning instrument, because we believe very firmly that any program of this sort must provide for motivation and stimulation in the home, for many, many reasons.

The foremost of those reasons probably is the matter of attendance. I have all sorts of information on this program from a technological and statistical standpoint which I can make available to you if you wish, and I'm not going to go into that too deeply. We have had basic results which are very encouraging.

After this initial experience, however, we realized that the logical destination of Project Breakthrough is in the Chicago public school system.

We are now making plans with them for take-over and expansion of the project in the elementary schools of the public school system. We're going to move, in the next two weeks, three machines from our present location, which is in a vocational school, loaned to us by the Board of Education, into an elementary school where we will take 50 per cent Head Start children, 50 per cent kindergarten children. We will continue an elaborate research design to measure the effect of the program on both of those groups so that they can be compared with the Brooklyn experience in the kindergarten group. In conformance to wishes of the Office of Economic Opportunity.

To do the most good to the most people in Chicago, it would require a marriage, so to speak, of the Cook County Department of Public Aid and the Board of Education. The Board of Education would take over the administrative and teaching duties of the program and the Cook County Department of Public Aid would supply, either through case workers, special case workers, or through sub-professionals who would be leaders in the community - probably those who are on some form of public assistance, motivation and stimulation in the home, and relate to the home the things that the child is doing in the program.

These things we would research and keep careful track of, just as we have kept track of the children in the original program. We have found - and I think this is interesting - that the use of case workers is not as productive as the use of sub-professionals. We have a woman, Mrs. Brown, in the program who has eight children, and lives in the neighborhood. She is able to get information for us from the families in that area faster than any case worker ever could, because the case worker has a stigma attached to her, as far as those people are concerned, due to the need for careful adherence to laws laid down by the Public Aid Department.

We intend to hire three more Mrs. Browns. Of course we can give case work or supportive services only to those who are on public assistance. But in Chicago this represents something like 50,000 children between the ages of two and a half and four, so that we're never going to run out of children; that's for sure.

Progress has already been made in this area. The School Board is anxious to take it over, but the old bugaboo of who pays for it comes back again. I suspect that I'll be back down in Washington shortly, talking to the U.S. Office of Education, asking for some assistance in this particular endeavor.

I'd just like to close with something that I'm going to have to read, because I think it illustrates what case work can do; what motivation, what stimulation can do in a family and why this is important for any family which has a two and a half, three, or four year old kid who comes from a disadvantaged family, from a deprived area, from what is called a slum area. The material was written to Dr. Gabriel Ofiesh who was then the Director for the Center for Educational Technology at Catholic University in Washington, and the reason it was written to him is because he was designated by the Office of Economic Opportunity to coordinate our program, and I believe Brooklyn and a program in Greeley, Colorado, as well.

Dear Dr. Ulrich: For quite some time you have had a rather personal and particular interest in one of the youngsters in the Project Breakthrough program. His name is Buford Andrews. When he enrolled in the program he was four and a half years old, and now he is five and a quarter. You were attracted to Buford because he was so completely withdrawn. It appeared obvious that he was both socially and intellectually retarded, and all of us wondered what if anything we could do with Buford. His younger brother Dick, now four and a half, enrolled in the project at the same time. Buford originally tested out at 53 on the Stanford Binet, and Dick at 61. The other day we administered post-tests to Buford and Dick. Buford's score was 87 and Dick's was 96. Since these results are phenomenal, we started to review the cases, and dig into some reasons which might make them believable.

The story is quite interesting. Buford and Dick come from a family of seven. There is the mother - father deserted a long time ago - five boys and one girl. One boy is a mute and another is retarded. Bonnie Rudolph, a special case worker for Project Breakthrough, and a good one, tells me that when she first visited the Andrews' apartment it resembled a circus more than a home. There was total lack of discipline and the mother had lost control of all of the boys. Bonnie appeared at meal time on one of the first visits and said she was really scared the way knives and food were thrown around.

The mother had adopted a "what's the use" attitude, and the family was headed for chaos. I checked with Bonnie Rudolph today before telling her the new scores of the boys, and she told me that things have changed in the Andrews household. The mother has great interest in her family. Her attitude toward the children has completely changed, and there is an obvious change in the relationship of the children toward each other. Bonnie says that she has done a lot of work with the family and is considered a welcome guest whenever she appears, but she also says she believes that Project Breakthrough deserves the major credit for the remarkable change in family function. I would be happy to say it is a combination of case work and Project Breakthrough because that is the team we have tried to put together.

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Once again, I want to point out that the "Talking Typewriter" has great potential in this area. It is important to keep in mind that this entire concept reverts to many things, not only the multiple discipline approach, but also the programmer. And I would be completely remiss if I didn't recognize our wonderful reading clinician, Mrs. Betty Goff, because she has essentially made this facet of Impetus a wide success.

Chairman: Thank you, Mr. Miller. We now have time to ask the panel to respond to questions from the audience. Please identify yourselves by name and location, and address your questions either to a particular panel member or indicate that anybody on the panel may choose to respond.

Man: St. Louis, Missouri: I'd like to ask Dr. Gotkin to clarify something for me. Maybe I heard this wrong. You mentioned no classroom follow-up? Can you explain this, why you feel this?

Dr. Lassar Gotkin: As I understand it, the question is, "Why don't we have any classroom follow-up?" I'd like to say I believe in classroom follow-up. I even believe that the learning in a teaching machine project should follow up classroom instruction. When I hear of services that people offer to beef up their Talking Typewriter projects to enhance the possibilities of reaching kids significantly, I am somewhat envious. But, what I have tried to point out is that at the outset we put the complete instructional burden on the machine lessons. We put the entire burden on the machine to do the teaching. The machine has to hold the interest of the children as well as instruct. In pursuing our instructional objectives we do not construct individual programs for each child. Basically, we have followed a linear model, but I would contend a very flexible one, and one which yields important results. Some of the conference attendees can attest to some of the payoff of having programs that stand this way when you then take them into other settings and implement them. We're concerned with getting a reproducible set of lessons, lessons that if someone else takes, they can expect to get similar results without supportive instructional services. This doesn't mean we don't believe in supportive services.

The value of this approach is that our results say: These lessons represent the instructional events and this is what level of learning occurred. Such an approach yields important information regarding individual differences. When we were developing our research proposal, I projected that one third of the students would learn from the basic linear sequence; one third would need a lot of branching, and I believed that one third of our target population of five year olds wouldn't be able to handle the complete machine format. I didn't say that very loud -- that we would need other kinds of instruction other than a pure machine instructional setting for approximately one third of the children.

The figures that have come through on several of our field tests, and the first 34 lessons of our final validation study break down to something like this:

1. The linear sequences are appropriate for approximately 50% of our target population, 2. another 25% are reached within the linear sequence but require a variety of branches at different stages in the sequence to make certain that they master the skills involved, and 3. for 25% of the students we need far more radical branches which take us out of the total machine setting. The information involved in these findings are important because I don't believe anyone else has ever tracked learners with the degree of accuracy we have over as long a period of time. The meaning of these results is related to complex issues regarding individual differences, that is, a surprising number of children do seem to be able to learn from the same sequence. On the other hand, there is an obvious limitation to gross generalizations about being able to teach all the individuals by the same sequence. Furthermore, these results have led to some general findings which are housed in the programs, as to how to program a machine so it can carry the major burden of direct instruction. As long as I have the floor, I would like to make one further point regarding the issue of "person to object". I do not think it is accurate to refer to the kinds of machines used today as objects. The relationship to such a machine is not merely the relationship of a person to an object. If you observe children watching television, you will that they interact with characters as persons. The television set or the ERE machine or any other teaching machine takes on the personality of the particular group working with it. The children talk to characters in lessons as they become involved with TV personalities. My three year old daughter has recently decided that she wishes to marry a young gentleman who conducts a discotheque program. For many children, Captain Kangaroo is alive. For several years of their lives, they

respond to him more than to many of the teachers in their classrooms. For them he is a real person. In programming your instruments I would hope you all make use of rhythm of voice and feel free to do what Ben Israel talks about when he puts music in the machine.

Dr. Benjamin Israel: Excuse me. We have done more than that. I have gotten from Larry McSweeney, his set of slides and lessons because there are certain youngsters we just couldn't reach with the materials we had. And so, we're using some of the lessons that they developed in their research operation for a small group of youngsters.

Chairman: Next question. Dr. Steg, would you like equal time?

Dr. Doreen Steg: No. I think, though, Dr. Gotkin, that you're really reinforcing the statement that I was trying to get across. You don't have the kind of dynamic give and take that you do in a person to person relationship, but you surely have communication, which is of entirely different magnitude.

Woman; Brooklyn, New York: Mr. Miller, I wonder if you would be able to clarify a little bit more the types of program you used with your junior high school and your high school student population?

Mr. Costa Miller: I'm going to ask Betty Goff if she would reply to this. Betty?

Mrs. Betty Goff: The programs for the junior high children were based on linguistic patterns. They included several lines with the pattern stating the word and all the essentials for each word, and then sentences on those. And we're still writing more of them. I found that they were very good to use with all the children at some time or other, the short vowel sounds and just working on anything at all because all the children are on the linguistic program at some time or other.

Chairman: Thank you, Mrs. Goff

Woman: Mr. Miller, do you work with autistic children?

Mr. Costa Miller: Well, we just started. Right now we are at the stage where we have met with the staff of Elwin Institute. They have come to visit our installation. We have shown them what we have to offer. We have gone to their campus to determine what we might do to assist these children, using the ERE. So actually, we are right now in the process of constructing programs to meet their needs. I really don't know exactly which way we're going, or how we're going to get there, but we have started with essentially, this approach which Mrs. Goff has just mentioned.

Dr. Doreen Steg: May I add something to this?

Chairman: Yes.

Dr. Doreen Steg: May I suggest that you use photographs of the children and their names, because this way they got very, very excited.

Mr. Costa Miller: We are going to begin with this, taking pictures of these children in a classroom situation at Elwin, and then we're going to focus our programs around them.

Chairman: Mr. Joseph

Mr. Joseph: Concerning this question of the difference of opinion between Dr. Steg and Mr. Gotkin, I think you might be interested to know why I chose the ERE. May I speak to this?

Chairman: Surely

Mr. Joseph: We were funded in the spring of '66 for a junior high school remedial reading program in which we introduced typewriters. The language laboratory indexed 300 which is a student response device. These youngsters, 633 of them out of 2,800 were reading from 3.7 up to 2.1. We found, however, in the social atmosphere of the group that some of the youngsters were still retreating within themselves and not giving vent to their true learning. I was searching, therefore, for an alternate method. What could I do for these 10, 12, 15? On November 25, 1965, in the Saturday Evening Post, an article by Dr. Stephen Graham, on the Talking Typewriter, hit me. I bombarded Harrisburg, Pa., and Harrisburg said, "Well, we understand the machine is very expensive. Can you afford it?" I said, "Yes, we can." They said, "If you want to brave the wrath of $40,000 to take ten or twelve children, go ahead."

But I think the important thing is Dr. Steg's point, that the set to learn was in the back of my mind.

How could I create a free learning atmosphere where a child does not have to feel out of place with the other youngsters in the group even though they've made all these measurements. And this is where I came up to this idea of augmenting and enhancing the learning situation in the controlled environment of the response environment. We even had one youngster who came into that booth the first time in his life who pounded the machine and swore - the first time he could swear at the teacher. That's all I have to say, that this is an important part of the use of the machine, to remove this non-learner from his group atmosphere of his peers where he will be subjected to this pressure.

It's all based on a study made, about two miles from our home in Chester, Swarthmore College. The psychology department there - Solomon Asch - developed a study on the group pressure on the individuals in the group. These were college students who changed their positive opinions of something positive even though they know it was wrong. Now what can we expect of the youngsters who come out of the ghetto, out of the urban school, now in a social situation. Twelve others are doing something right; he's still not. You know what happens to him and this is why I want this response environment.

Chairman: Another question?

Woman; Willowbrook State School: Dr. Steg, I have a question. You mentioned linear versus branching program learning. And as I understand linear, its given A and given B, you can proceed to C and D in blocks and frames whereas to my mind the only way you can create branching with the ERE is to create another program to branch. You can't do it with the machine. In other words, the only way you can create branching is to create another program if the child has a hangup on those blocks.

Dr. Doreen Steg: Well, I should say that I did not really mean linear versus branching. I meant both linear and branching programs and try to explain what it is that occurs in the learning situation, and if you talk about sensory feedback, it's not linear versus branching, but it's linear and branching versus dynamic sensory feedback perception, which is an entirely different thing.

As I understand it, we certainly do get branching in the ERE, and I think perhaps Lori can point out much more specifically some of the ways because we haven't done it in that particular way but I think Lori has.

Chairman: May I respond from my own biases in this field? I think the argument is somewhat artificial based on the history of the development of the concept of the program. The concept of programming was, and is less so today than in the previous ten years, pretty much limited to a concept of verbal, silent, prose material. The introduction of graphics and pictorial, paralleled by prose material.

The adjunct and addition of a third medium, the audio, the voice component, now produces a three dimensional linear program. You have burst the bonds of Skinner's original conception designs. Now when you take a fourth dimension, like the old fashioned child brain of three strands, and now introduce a fourth, which is the student's intervention and consequences in these three modes, I think the difference is that you are no longer talking about programming literally or branching-wise.

When you have a multi-media, multi-sensory, multi-vehicle presentation in simultaneous or in rapid concurrent sequences, when your instrumentation forces you to use visual, graphic, pictorial prose and audio and a student's intervention predetermined by field experience, that is, the kinds of consequences of student intervention in this process, you now have a new total perceptual field. The program is now more than that which you programmed. It is the learner's perception through his several senses of what you are severally, concurrently presenting to him.

Now, if you go back to the original Skinnerian single bit, frame by frame, essentially prose representation, the reduction of all mankind to that single funnel proposition, you are forced to a concept of branching simply because all mankind will not meet that single mode.

One more point. The absurdity of that position comes about through the universal use of one mode, one piece of human learning style, repetitiously overused as though it was the only variation from perso to person in a learning situation, and that's called each child can proceed at his own pace.

What an absolute universal absurdity this is, as though pace was the only variant from learner to learner, when there are at least 27 others that we can identify and at least 40 more that in our ignorance we've not yet identified. From child to child, from learner to learner the employment or dominance of that child's eyes as a receptor over another child's eyes as a receptor to his ears, to his kinesiology, to his tactile differences, to his mood level, to total bodily stance, to the way he confronts in a whole organism, in a total mobilization of those multi-senses, these variants are so much more important than the single, universal use out of ignorance of the term pacing. It is as though a giant computer brought to the act of learning, one magnificent addition, children may proceed at their own pace. Pacing is a very small piece of differences from one learner to another.

And so the whole concept of linearity of program, A to B to C, and if C doesn't work branch to a sub-C, is an impoverishment of the concept. And I hope that we'll break that bond by the very diversity of the capacity of the machine pushes upon us in our programming and so forth.

END OF THURSDAY AM SESSION

THURSDAY - EVENING SESSION
DINNER
Chairman: Mr. Myles S. Spector, President, RBC

Mr. Myles S. Spector: Our speaker of the evening is Dr. Marshall McLuhan a man that needs little introduction on my part or anyone else's. However, I would like to give a brief description of Dr. McLuhan's background. He is a native of Alberta, Canada, Professor at St. Michael's College at the University of Toronto, Director of the Center for Culture and Technology at the University of Toronto, known throughout the world for studies in the field of culture, technology and communications.

Dr. McLuhan was chairman of the Ford Foundation Seminar on Culture and Communication, Director of the Media Project for the National Association of Educational Broadcasters in the Office of Education. He is an author of many, many papers, and several books, among the most recent and perhaps best known are Understanding Media and The Medium Is The Message with which some of you are quite familiar.

Dr. McLuhan is presently the Albert Schweitzer Professor in Humanities at Fordham University here in New York City, and it's indeed a great, great pleasure for me now to introduce to you Dr. Herbert Marshall McLuhan.

Dr. Marshall McLuhan: In spite of all that, I feel quite at home and relaxed. Is my mike on? The tick - the little tapping of the glass reminded me of something I was talking to Mr. Spector about at supper, and it's typical of a great many of the things that I find exciting lately. Pavlov in his experiments of conditioned reflexes did not use stimuli, he used environments. Now our psychologists are so stimulus-oriented that they never pay any attention to the facts that Pavlov carefully laid before them. What he did was to build for his dogs environments in which the temperature was exactly controlled for weeks at a time, sounds were controlled, and light levels were controlled. The slightest variation in these elements prevented any salivation in the dogs.

If they shifted the light a single point, no salivation occurred at the ordinary time. It was done not by stimuli in our sense of the little tickle, but by moods that lasted for days and weeks at a time. He built environments as stimuli. That's what you're doing with your "Talking Typewriters", without knowing it, that is, I don't think you know all the implications. You are building instruments that are very compatible with the T.V. generation, because the T.V. generation is not visually oriented. Your Typewriters are not visually oriented; they appeal to all the senses. Active touch, passive touch, sight, sound, involvement.

The word involvement is the key word of our time. For 2,500 years the Western world has boasted of detachment, of its visual culture. No other culture in the history of the world ever had detachment. Now we have lost ours and have become involved for good or ill.

Visually oriented people are always trying to find out what's the point of view, what are the values that really motivate this guy or that. My values are simply the excitement of discovery, and an old teacher of mine, I.A. Richards has in the current Saturday Review of Literature an article called "Feed Forward." What he is talking about is the probe: not waiting for feedback as a consumer, but living the life of the perpetual live probe of experience.

That's feed-forward. There's no point of view in probe because you don't know from one moment to the next what you're going to find out.

If you want to make discoveries, change environments, because it alters youf forms of perception. Discovery is not done by concepts: it's done by percept. The visual man lives like a fish in an environment he does not know. The fish does not know anything about water. The visual culture of our past 2,500 years knows nothing about vision. The properties of visual space, for example: visual space is the only space that is uniform, the other sensory spaces are not continuous, not connected, not uniform. The TV generation is not growing up in visual space. TV is not a visual form. It's iconic, tactile, X-ray, involved, totally unlike visual space.

The sensorium of the 13 or 14 year old child is not that of the 18 year old. A totally new kind of human being is coming into existence with TV. It's not entirely unprepared for, since we have long ago put our nervous systems outside, in telephone, telegraph, radio and other forms. This is literally putting the nervous system, which is an electric thing, outside as an environment increased fantastically - compared to any of the old man-made environments, say, of the railway age.

How does a kid growing up in the electric age with an environment of pure information cope with so much data? There is nothing in our school system to give him the slightest clue of how to cope with an environment made of information. At IBM when they faced this problem a few years ago they said, "Information overloads can only be handled by pattern-recognition." You cannot do it by data classification.

At high speeds you deal only with patterns, not with data. Such is the high speed of our data-feedback computerization that in a very few years, I mean ten or sixteen years, speech itself may be obsolete. It isn't only reading and writing that are threatened by the new electric technology; speech is already becoming obsolete. It's too fragmented, too specialized, too broken up around the globe for any serious use. I thought a tremendous example of this was given us by the Pueblo episode. A bunch of robots took over the intelligence system of the United States. Subliterates, semiliterates moved in at the highest level of intelligence, and took over.

This happened in this country long ago with the Mafia, an oral people. They cannot adjust to a highly visual culture like the United States, but so they move in to the areas that we neglect, the word-of-mouth they control. Notice that they do not control the school system.

It's the biggest business in the world and they don't have a single foothold in it. Why? We're so literate, so specialist, that these native tribal types, the Mafia, can't get in. The literate man is an specialist, a fragmented individual.

But any speedup of information creates new environments and creates a new alienation of human beings from the moment any new technology is formed. The individual is alienated from his past, all that he has ever learned and known. For example, even when such a simple thing as a railway came in, all homes were broken up. People would walk a few miles, get a ticket and go a thousand miles. It broke up neighborhoods, and families.

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It is called by *James Joyce* "the Heliotropic, nought time." "Heliotropic" because of the TV screen, like the heliotrope we all turn towards the TV screen, and do our best to get inside. But "heliotropic nought time" is the form of our new culture.

A teacher asked a class, What does the Twentieth Century owe to Thomas Edison? A student hand went up. Teacher, if it weren't for Edison we would all be watching television by candlelight. The old fashioned joke with the long story line is finished, just as the story line is finished in the model in the movie in every form whatever. It's also finished for the classroom. Instruction must yield to discovery.

But Americans don't tell jokes these days. They have a few gags. In Canada, from where I hail, the joke is very much more prevalent because we're very much less tense and the forms of catharsis we use are very much more plentiful.

That raises a theme. Two spectacular events occurred in Canada in the last few weeks. Cardinal Leger resigned his position, the first cardinal in the recent history of the church ever to resign. And our Prime Minister, the scholarly Lester Pearson resigned from the head of the government just because he's tired of reading scripts into microphones.

Today we live in the age of the executive dropout. Don't be misled by the infant dropouts. The real dropouts (and by far the largest number) are executives. The higher the executive, the sooner the dropout. Why? All the exciting things, all the involved and participating things, and all the discoveries are taking place down much lower in the scale. He's utterly left out, high and dry, helpless and unnoticed. There are hundreds of American colleges looking for presidents at the present moment, and there will be thousands before long.

A university president is a meaningless character today, in the speedup of information, when all the excitement is in a much more heavily stratified area than his little organization chart gives him. There is no reason for remaining high up. Mr. Knudson can shift over to Ford easily, it doesn't make any difference. His role at Ford or General Motors is zero. Just a bit of stage furniture. Participation no longer takes place high up. Involvement cannot happen at the high levels of organization charts.

The speedup of information decentralizes all structures whatever, military or educational or social, so that with the telephone on Easter Island in the Pacific you can conduct world affairs as easily as you can in Washington. There is no need to be anywhere in particular on this planet, and shortly of course it will be done from the moon. I like that phrase in *The Naked Ape* by Desmond Morris. The naked ape speeds toward the moon with a picture of his wife and kids in the wallet. Slightly out of phase.

Our NASA program is Newtonian, utterly obsolete, utterly unrelated to the Twentieth Century. Firecrackers and explosions for journalists only. Rear view mirror, the bigger the scientist the more he is locked in old forms of knowledge, the less he can afford to get involved in discovery. That brings up another simple fact. In the newspapers the only real news is bad news. Good news is just advertising.

This is literally true, not figuratively. No newspaper could live without advertising. On the other hand, as a newspaper it depends entirely on bad news. No bad news, no news at all. If they can't find it in politics, they'll find it in the weather. There are endless places to look for bad news. Good news travels very slowly in our present setup.

Here's some "good news" that hasn't traveled at all: Out on the West Coast, an old friend of mine, Archie McKinnon, has been carrying out some experiments with natives from the deepest jungles of the world. He insists on dealing only with natives who have had no contact whatever with any Western form of privacy. In three months he has these people flying four-engine jets and also taking the engines apart and reassembling and repairing them with ease. He turns them over to the medical school for a little preparation in diagnostic work, and, to the consternation of doctors, these people have infallible powers of diagnosis. They can diagnose any illness and the organ it's located in and the stage at which it has developed, instantly, by smell. Not having a visual sense that has siphoned off all their other energies, they can detect these forms of illness and discriminate among them by the sense of smell alone.

That's good news, but not to the medical profession. That will not travel. You see, if someone discovered a substitute for petroleum that cost a dime a gallon, they would have to be crushed at once. Our whole economy would be destroyed. The motor car is obsolete and will not last very long, any more than our road system that goes with it. Nyer in Africa has no railways or roads. He governs by helicopter. He just pops down and talks with his people all over Tanzania. He's not going to bother to build any roads. He doesn't want any industry in his country. No hardware.

The information age is an age of software, not hardware. It'll last out the computer. General Motors is finished.

London Bridge is not falling down; it's being taken down, dismantled as a curio and sent to Texas. New York will suffer the same fate within a few years. All big cities are horrors from any human point of view, and they are the result of the centralizing technologies of the wheel, which are all obsolete.

And, that brings up another very big subject. When any technological change occurs, our image of ourselves and I, our fellow man, is altered totally. What is called alienation, loneliness, misery, psychic dislocation is the result of any new technology. Our children are going through the most horrible anguish because of the TV revolution, the information revolution which provides them with no image that they can relate to anything that we have ever dealt with before. They feel utterly cut off from everything that means anything to us.

The Oriental world went through this misery. They thought they could get rid of the misery of man by abolishing human individuality and personality and doing the "inner trip" totally. The electric age is engaged in an inner trip. You can tell that from our art, our literature, our music; it doesn't matter where you look.

Now, you want practical suggestions? Study the human sensorium. Learn how to take the pressure off it by programming environments, not the content of environments. The content of environments is of no consequence whatever. The dynamic pattern, the dynamic pressures and processes set up as they hit the human psyche is what matters.

For example, the London Bridge is being taken down, for technological reasons. The Queen Mary was the victim of the airplane. None of the navies or ships of the world can survive the airplane. A revolution on that scale, happening that fast, is what gives us a chance for the first time in human history to see what causes these things. Our ancestors never had a clue as to what was causing events. When things happen at a very high speed, the pattern becomes fairly easily discernible. It's like a wave: if it took ten minutes for a wave to form and break, you couldn't see any pattern. It has to occur at a certain speed before any pattern is discernible.

In the electric age, patterns begin to stick out a mile. For your world of reading, for example, pay much heed to the need for much faster reading if you want to survive. Faster reading enables you to get the pattern of thought without benefit of words at all. There is no book that I know of that has more than ten pages of meaning in it. Why read 400 pages to get ten pages, at most, of observation and valid comment?

Any book that has ten pages of valid comment is a very good book. Edmund Burke said, in his Reflections on the French Revolution, which is a great book. The first right, he said, of every man in civilized society is the right to be protected against the consequences of his own stupidity. We have no such mechanisms in government or education. We allow the new technologies to rage through the land without the slightest attempt to foresee their consequences.

I have a book coming out called Culture Is Our Business. In the information age all businesses automatically become culture. There's a delightful advertisement in this morning's New York Times, a two-page spread - notice please that ads are taking on a totally different form than they used to have.

Now this double-page spread is for Portugese Airlines and on this page, The American Dream; on that page, the Portugal Dream. In an airplane here, you see people seated in robotlike uniformity, and the same airplane over here is supplied with dancers, palm trees, waiters, wine - you name it. The spaces are different. Literate man lives by uniformity, homogeneity. This enables him to perform miracles of quantity and scope. But the electric age is not a consumer age. The consumer age is finished. We're moving in to a do-it-yourself period in which programming and control of the environment of the telephone for the small child.

The telephone is an environment, a service environment. Nobody owns a telephone. Nobody would want to own a telephone. You rent them. The age of the personally owned car is finished. And this is merely a hint, in terms of the old technology, of what is coming for the new technology. The new technology will be totally environmental and not this fragmentary, piecemeal stuff that we have kicking around at present.

Now what is the future of the Talking Typewriter in terms of the electric age? I think it's promising. It uses all the senses, and that's the first need for survival. I would suggest right off, get rid of that alphabet of smooth letters and start using rough script in its place if you want the kids to pay any attention, or if you want to increase their attention or involvement.

There are lots of suggestions, but I'm not here to make suggestions to people who are experts in this field. The need is for the study of the human senses because our new electric time uses them all, whereas for 2,500 years we have used only sight. So we're somewhat paralyzed by the challenge of the new environments. The teenagers, I mean the TV generation of 13 and under, are completely unlike their 18 year old brothers and sisters. There's a culture gap there that's a mile wide.

Nothing like this ever happened before in human history. I'm perfectly happy to pause right here and invite your comments, queries, complaints, indignation, anything.

Chairman: There's a question over here.

Woman: You mentioned the environment and then the content of the environment. I don't think - at least to my mind - it wasn't clear how you distinguish the two.

Dr. Marshall McLuhan: Well, visual space is enclosed space. Auditory space is not. The only space that encloses is visual. Tactile, kinetic, visceral, auditory - all the other senses are discontinuous and unenclosed. For example, auditory space is, as one psychologist put it - a space whose center is everywhere and whose circumference is nowhere. (That was the neo-Platonic definition of God 2,000 years ago.) Auditory space, which is the instantaneous space of the electric revolution, has no centers and no margins. It doesn't enclose anything..

In it, each object makes its own space. This is called spacetime. Einstein was not really all that profound. Any artist could have told him all he knew. Every object makes its own space, is not contained in any space, and that's equally true of people. The visual man always tries to enclose people and knowledge and things in classified forms and packages. You can't do that under electric conditions, because the visual monopoly is finished.

Before we stressed only one sense. Now all the senses come into play, whether we like it or not. The whole nervous system is now around us as an environment. And that includes pain, because pain is not a sense like touch or taste or sound; it is part of the nervous system.

So as we put our nervous system outside, we raise the power of human suffering millions of times. How are we going to control that? First, by understanding what it's made of. But this - to your question, that is the answer; enclosed space has content. Visual space has content. The first people to enclose space in human history were the Romans with their arches. The Egyptians, the Greeks, the Incas - no civilization before the Romans ever enclosed space. Why were they able to enclose space? Because their visual capacity was enormously intensified not only by their alphabet, but by the use of papyrus, cheap paper.

The Greeks had only parchment, and it was so expensive that the amount of literacy in the quantitative sense was very small. But the Romans had cheap papyrus, and everybody could read and write. They even had book markets and fixed prices in books and that sort of thing. When papyrus dried up, Rome was finished. It's roads were no longer used. The Egyptians suddenly had a great wave of nationalism and said, no more export of papyrus, and Rome was finished.

Suppose somebody decided to boycott all further use of petroleum? It would have a considerable effect on human life as we know it. But the Romans depended entirely on papyrus for their armies, their bureaucracies, and their administration of the whole blooming empire. They were so visual that they could enclose space. Now I'm not giving you an opinion.

In his book, The Beginnings of Architecture, Sigfried Gideon traces every form of architectural space from Paleolithic times. And he says, the first moment of enclosure of space was the Roman arch. It was passed on through the Middle Ages to some extent and then increased greatly with the Renaissance.

Paper came back from China in the Eleventh Century. As soon as paper came back, the Romans were brought into play again by the Renaissance. It was not a Greek revival. It was a Roman revival, thanks to cheap paper from China.

In the Middle Ages there was no cheap paper. Only parchment. It took 100 calves or what-not to make a book. Queries, complaints, jokes - remember it is to Steve Allen that I owe the great insight: the funny man is the man with a grievance.

Mark Twain was one of the most bitter, disillusioned men who ever lived. So was Stephen Leacock. You name a great humorist and you're naming a bitter, misanthropic character. But that shouldn't prevent us from laughing at their work, as Mark Twain once said: "It's good for a dog to have fleas. It stops him from worrying about being a dog."

END OF DINNER SESSION

FRIDAY - LUNCHEON PANEL PROGRAM - "EXCEPTIONAL LEARNERS"

Chairman: Dr. Milton Katz, Director of Programming, ERE Systems

Chairman: There is in a faraway country called the United States a very sadistic custom; it's called after-dinner speaking.

This session will address itself to Exceptional Learners. Yesterday morning we dealt with Non-Exceptional Learners in terms of basal and remedial language arts and reading. And that is what you would find in a standard school system. Today we are dealing more with institutions and mental hospitals. Our first speaker, quite appropriately enough, is that eloquent and charming Dr. Goodwin to whom much of the aura, the positive aura that attaches to the Edison Responsive Environment is due. Not only does she speak well, her sincerity and concern for the patients or students is so entirely obvious. Dr. Mary Goodwin.

Dr. Mary Goodwin: Thank you, Dr. Katz. I think I'll have a difficult time living up to that very nice introduction. The use of the ERE by autistic children is responsible for a very curious paradox, which is, that the instrument has perhaps its greatest potential or very great potential in its use with autistic children and also creates the greatest hazards. I'd like to remind you that the subjects, the autistic children of whom we are talking, are very seriously damaged children, ill with a very perplexing syndrome, the cause of which is unknown, the treatment of which has not been successful in most cases to date, and the general management of which has been directed at psychological factors rather than physical or the organic.

So, I'm not talking about a story of curing children. I'm rather talking about a drama of change in children, change in children who were previously thought to be incapable of change, and incapable of learning, children who have abilities that have not previously been recognized, and to find in these children evidences of learning that had not previously been measured, although they may have been subjected to a variety of psychological tests that conventionally detect learning in children.

For the physician - and so far I am almost the only physician who has been fortunate enough to be able to observe a number of these children over a period of time - for the physician, the machine has demonstrated that intervention with children thought to be hopeless, is possible, that it is very important to be aware of the need for correcting sensory defects in these autistic children, visual defects, hearing impairment of the sort that had previously been overlooked at the expense of psychiatric treatment.

In other words, a hearing impaired, a visually impaired autistic child is often left with a visual and hearing impairment, and - while extensive and often expensive psychiatric treatment is pursued, or even educational experience, although many of these children are deprived of the latter.

Thirdly, it is very important for the physician to recognize the possibilities of the coexistence of significant organic illness in these children who also have the symptoms of autism. There will not be time here to pursue this, but I think some of you are familiar with the classical story of the young boy who turned out having been admitted to a state institution by one of the more distinguished psychiatrists in America. Having been a resident there for a year and a half, he was found to have a very serious malabsorption syndrome which had been present in the child since eleven months of age at least, and at the time we first saw him he was six and a half.

There are many other instances of this, and it does emphasize the importance of remembering that the child is a child with physical equipment before it is a child with autism. And then I would like to point out that the clues for further investigation in the fields of genetics, biochemistry, neurophysiology, and psychology and cognitive development are many, and that these can be pursued. Various institutions and laboratories everywhere can be kept happily occupied for a very long time.

The program at Cooperstown at the Bassett Hospital developed as a sequel of two years of experience with a remedial reading program for normally intelligent children. At the end of two years it was obvious that the problems in many instances were the result of the fact that the classroom experience did fail to take into account the stage of neurophysiologic development, of growth of eye-hand skills in the children, and that it would be suitable to try to find an environment more responsive than the ordinary classroom to the quest for learning of the child.

And it was at that time that we heard about the ERE, and many of you are familiar with the sequence of events during the next three years. We were able - Mr. [illegible] who is here in the audience in charge of the teaching program, and with the help of two imaginative and delightful women, one of whom was not an experienced teacher, it was possible to see during 28 months about 150 children. About 75 fall into the category of retarded readers of normal intelligence, and I won't pursue this except to say that as you've all heard in the last few days, it is certainly suitable to continue the use of this instrument with retarded readers.

In an effort to evaluate numerically the progress of these children, the results have certainly been encouraging. The statistical analysis of these results of course is subject to the usual problems of the fact that the children were in school anyway and so forth. In any event, it is useful for retarded readers. And that may be an understatement.

The autistic children, made up of a group of about 25, referred to Cooperstown from a variety of well known clinics of medical centers up and down the Eastern Seaboard, came to us, bringing behind them enormous histories of multiple diagnostic evaluations in many different centers ranging from mental retardation to autism, to childhood schizophrenia, to specific learning disability, to aphasia, to chronic brain syndrome, to minimal brain damage. Many of these children had had all these diagnoses, without any recommendations or suitable place for treatment.

What we saw in Cooperstown, among the 25 children, were children who had apparently been subjected to some kind of illness or insult, perhaps before birth, who were thereby damaged in such a way that their landmarks of normal development were absent or disturbed, and often with the conventional picture of delayed or absent speech and withdrawal from personal contacts. And having been so damaged, behaved in an unexpected fashion, were received in the world in an unexpected fashion, because adults who are faced with a deviating,

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mute, and incidentally I learned that the mothers are the best informants about these children. If you listen to what the mothers and fathers are telling you about the behavior of these children, you will learn more than from any other single source. And the mother of this little nine year old, so-called mute, wrote me a letter not long ago saying, "You know, I think that pediatricians suffer from a disease called mother deafness." And I think this applies to more than pediatricians.

In any event, Billy was at the state hospital, excluded from classroom because he was thought to be mute, and less than a year later was still a very hyperactive, often very difficult child to manage, but talking a blue streak.

Another instance is of a boy just exactly seven who lives near Albany and for whom I made many long distance telephone calls and sent many letters trying to persuade a first grade school classroom to allow him to sit in the classroom, because he is mute in public, fortunately well behaved, and thought to be severely retarded. They finally yielded and allowed him in a regular classroom, and Peter, this winter, has been writing books. He's by far the best child in the first grade and has composed series of books, books of verse and rhymes, all illustrated with spelling, that is, sometimes fourth, fifth, sixth grade level.

He can read anything, as nearly as we can tell. And yet his first experience in school has been since September, this year. And the drama among these few children we have been lucky enough to see, continues. I've had a chance to see a number more during this winter, but I haven't had access to an ERE, and now that I have, again, we see occasionally this change, this light shed on the true nature of these children's difficulties.

And so I want to say perhaps just three things more. First of all, if any professional person in the management of autistic children is retained and all the rest thrown away, I would hold a teacher who is willing to begin with these children at whatever point of contact they can make. And here is the usefulness of the ERE, because for a teacher this instrument makes it possible to see, have guidelines as to where she may be able to interact with the child.

Secondly, I would suggest a wide-angled look at these children, and regard the diagnosis with which you are confronted, autism, etc., as descriptions and not diagnoses. First of all, there's a child who is behaving differently. And secondly don't have any expectation of cure. And don't get involved in saying the typewriter is a treatment for autistic children. The typewriter is the same thing for autistic children that it is for all children.

I'd be glad to pursue some of these points if you are interested, and as most people know, there are details of various stories of some interesting things about some of the older patients, but at this point, I'll yield the floor to the next speaker.

Chairman: I was remiss. I was supposed to limit the speakers, but I feel it's a deficiency in the design of this particular program that Dr. Goodwin wasn't given an entire panel discussion all of her own, because she hardly got started. Our next speaker is a fake. You may have noticed on your list of attendees that there is an Elizabeth Taylor and a Robert Wagner attending this conference. Well, the Robert Wagner who comes next is not the Robert Wagner that you thought he would be. He's more attractive, and he is in fact the supervisor of Special Education at the St. Louis State School and Hospital in Missouri and co-author of a paper: The Didacti Value of Role Playing for the Institutionalized Mental Retardates.

I hope he won't talk about that. His title is: Adapting the Phonovisual Method for the ERE System. Mr. Robert Wagner.

Mr. Robert Wagner: We had a basic problem in Missouri. We started a progressive program for retarded children, shying away from the old ideas. We did this due to Missouri's being behind many states in the installation of Dr. Frederick A. Indorf as Assistant Director of the Division of Mental Diseases, in charge of education. One point he wished to convey was the need for speech and language development of these retarded children, probably the greatest single barrier of their educational development. Our children are in an institution and greatly separated from normal social contacts which usually aid the development of proper speech habits. If you have ever seen some of the older institutions in this country you will realize the situation we were in at the time. It sounds as if I am taking a jaundiced view of our program but this is necessary if you want to have any program advancement.

We had a choice as to which method of speech and language development we wished to use. There is the Initial Teaching Alphabet, or ITA method and the Phono-Visual method. We chose the Phono-Visual method because it seemed to be more realistic for the type of children we have in our program.

There are one hundred and forty children in our program, seventy-four of which need a program of either speech, remedial reading, or total language development. Sixty are involved with our one ERE. In a week's time, consisting of thirty-five hours, we must allow each child two opportunities with the ERE. We had a problem! With only thrity-five hours and sixty children we needed a program that related to the classroom work yet remained as an introductory method for the Sullivan materials. A media which when used on the machine bridged the gap between the retarded non-reader and the more advanced Sullivan programs. The Phono-Visual Program was the answer.

If there is anyone who does not understand what the Phono-Visual Program attempts to do I will give a brief explanation. We have an excellent example right outside of the hotel. If you look out the windows you will see several ships. The first two letters in the word ship are SH, and when pronounced you have the sound SHHHHH. It is fairly easy to say this sound and easier still to associate it with the picture of a ship. If you were to place the letters SH on a card with the picture of a ship you would then have the complete Phono-Visual card for the SH sound. Phono, meaning phonic, and visual, meaning sight, or as in this case picture. These cards can be held by the child during class or can be related to the large chart showing all of the sounds. Every time the child sees the letters SH in a word he then associates, that sound like the sh in ship. It becomes the ship sound for the child. Other examples are the pig sound for P, and the bear sound for B. All in all, we have twenty-six consonant sounds and seventeen vowel sounds.

This lends itself ideally to the Talking Typewriter and its visual capabilities. The 3M Company worked as consultants and determined what they could do with transparencies and slides. Much time was spent by all concerned in the development of this program. It has turned out to be an excellent drill and quite good in the overall development of new learning. The reason we did this with little audio on the machine's part, other than clues and directions, was due to the difficulty of differentiating between certain sounds, i.e. CH and SH, also F and TH. So, it was necessary to have a program that had very little sound, just the associative letters and pictures.

The method...We use the expandable keyboard, covering the typewriter keys and pointer as these have no real place in the format of the program. On the expandable keyboard we might take ten basic phono-visual sounds. You may want to start with the silent ones, i.e. P-pig sound, B-bear sound, which are all fairly basic sounds. You place, on the keyboard, the picture of the sound or just the letter, whichever gives the results that you are attempting to obtain. On the slide screen you program your picture. You can divide your slides in any one of three ways. You can show the whole card (letter and picture), show just the letter or just the picture. The association is then made by the child who attempts to complete the comparison by depressing the proper key. In doing this you have very little audio contact between the child and the ERE, no recorded sounds are really necessary. The program works.

The total program includes three steps. The children proceed to the ERE after a basic program of the initial sounds with the Speech Therapist. Then they transfer back to the classroom after each session on the ERE. These then reinforce any new knowledge obtained while using the machine.

This program has been extremely useful to us. Many of you have expressed interest in this program so I have the basic program available for those who wish to review it. I'm not a salesman, but if you are interested in the purchase of the 129 slides and 80 transparencies, you may contact me. Of primary importance is, if used properly on the ERE, favorable results can be obtained. We have had success and are quite pleased. Thank you.

Chairman: I'd like to call attention to a dichotomy which has been developed through the past two speakers. Dr. Goodwin, who is a pioneer in this ERE application, was talking about working with youngsters on an individual basis, and what Mr. Wagner was talking about, is a kind of mass application, which if we're going to be talking about funding, and continuing support for this kind of system, will have to be some portion of the system.

These are not opposed points of view. They are rather supplementary, and in fact one of them, Dr. Goodwin's is a prior necessity before anything like what Mr. Wagner has been doing can be done. Neither of them is to the exclusion of the other, and I hope it never is. Our next speaker has to speak very briefly. I'm going to steal most of her talk which will be - I didn't know I was coming here to talk at all. But she's exotic; that is, she comes from over the ocean. She has received some notice in the London Daily Telegraph. I guess most of you have seen that. And so we have our Sunday Supplement Lady, Miss Jill Boyde.

Miss Jill Boyde: Perhaps I should start by giving you a brief outline of our work in England, and then tell you about one or two of the experiences I've encountered with children on the Talking Typewriter.

There are three installations in England. One at the Research Center, where I work; one in Wiltshire, where work has been going on for some months with adult illiterates in the Army; and the third at the new Headquarters of the National Society for Mentally Handicapped Children. We have two machines there and an Educational Psychologist has just embarked upon a new research project.

As a voluntary social worker, I worked for many years with handicapped children - mostly severely retarded - and I have to admit that when I started my present appointment I was extremely sceptical, for it seemed unlikely to me then that a machine could help to teach such children. It was in this frame of mind that we started off. Five extremely disturbed children were selected from a nearby school for physically handicapped children, and in the initial stages, when they were put on to the free exploration (or Second Phase) phase, very little occurred to make me change my mind. It was only when they moved on to the Card (or Third Phase) Phase that I began to appreciate the real potential of the machine. Yesterday at one of the Workshops, a colleague said that at this embryonic stage it was useful to hear stories about children with whom we have worked, so here are one or two.

Eddie was born a normal child, but at the age of seven he was hit by a car, and his brain was severely damaged - the result of which was that he has suffered from violent temper tantrums ever since, and is paralysed down the right side of his body, so he is able to type with his left hand only. However, in spite of the fact that his reading had not improved at all during the past six years. After 70, 20 minute sessions at our Center, his reading age improved 18 months. You may not think this very much but we thought it excellent in view of his violent and uncooperative behavior at schoo The machine definitely helped to stabilize Eddie, and during the whol of his time with us, he had only one temper tantrum.

Then there was Pauline. She is spastic, brain damaged and epileptic. She was, in fact, the only child we had who had been officially assessed as "ineducable." Her moods ranged from tearful to very gay and giggly, and she was rather an hysterical child.

Again the machine helped to calm her emotions but one day she was in a terrible mood, partly due to the fact that we had chosen an unsuitable program for her. (and suitability of subject matter is extremely important with a child like this.) She was screaming at it, and saying "I hate you . My teacher thinks this is a complete waste of time.", and "You made me late for cooking yesterday." While she was becoming more and more hysterical, the machine kept repeating "E", "E", "Screen key", and very slowly, and with tears streaming down her face, she picked up her little hands and started to type. Fifteen minutes later when her session was over she came out. She had completely forgotten how she started off. This I think really shows the great value of the machine, because if this had happened in her classroom, the teacher having been told to "shut her face" would have been duty-bound to reprimand the child in front of the others, Pauline would have become more hysterical and half an hour's learning would have been lost.

John was 15 years and three months. He wasn't with us very long as he had to leave because of his age. His family history was absolutely appalling and he suffered from visual and auditory hallucinations. His pace at school was extremely slow. In fact, his teacher said to me, "If this is for research, please don't take him because he's so hopeless - you won't get any useful result from him." Indeed, he was slow and extremely deliberate, but althou one could appreciate how exasperating he would be in an overcrowded classroom of, say, 40 youngsters, when he was at the machine he read back absolutely correctly, presumably because he was not hurri or interrupted. This was reported back to his school. It then came back to me: "You must be out of your mind, he can't even read an elementary sentence." So we checked and double checked. We did this in various ways, asking him [illegible] to read at the end of a sentence, [illegible] and [illegible] words, [illegible] into a [illegible] and so on. The result was always the same. He read perfectly.

[illegible], I suppose, could be termed our only failure. His I.Q. was only [illegible] and although he could copy letters very rapidly, he never even learned to take dictation. He never even learned to read a single word. However, when he first came to us he was an extremely shy, [illegible], whimpering little boy who crept out of the school the last of all, and who went [illegible] if anyone looked at him. Yet, after several sessions on the "Talking Typewriter" he was able to speak up for himself, stand up to the other children, and ask me for certain subjects that he wanted made into programs. His [illegible] personality blossomed out, therefore, I feel it wrong to term him a "failure."

[illegible] was the most difficult child of the five. At the beginning, our programs were really too simple for him, and as he was an extremely bright [illegible] child he left because he was bored. After one term away he came back, and this time the rapid change that took place was incredible. The teacher had asked to see me [illegible]. "I despair of him," he said. "I wash my hands of him. For God's sake, take him back!" So we did.

In spite of his extreme apathy at school, when he was at the Center he was bright-eyed and laughing, and working and reading book with quite obvious enjoyment. It was then that I realized it was not good that these children, being just working and good at the Center, were not at school. We had to take it one step further and enable them to take what they had learned on the "Talking Typewriter" into the outside world. This was our next step and then unfortunately I became ill.

While I was away, my Assistant took over and one day I walked into the Center unexpectedly. There was a sheet of paper on my desk and on it was typed, "[illegible]. Love from [illegible]. How is [illegible]?" The words had been typed by her on an old portable that I had lent her. Obviously, at the beginning she found it much more difficult to type on this than on the machine, because of her spasticity. Don't forget that this is the child, who, when she started with us, not only had been officially assessed as "ineducable", but didn't

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Through the use of the unit, specific reading difficulties were either eliminated or downgraded by strengthening listening abilities, eliminating major distractions, and above all, I think one of the greatest things was the elimination of competition with other class members.

Basic reading concepts were presented in a more relaxed, quite, undisturbed manner through semiconcrete experiences of sight, sound, and touch.

Reading programs were developed to meet the individual needs, but they were not necessarily an individualized program per se. There was overlapping, so those who had the same or similar difficulties at a particular level could make use of and benefit from these.

The following techniques were used for developing good reading habits: basic phonics, sight, words for word recognition, short phrases, sentences for comprehension, reading and understanding of short stories, either on the unit or in an easy reading textbook.

Other basic techniques were rhythm and riddle completion, commands and sounds on the cards.

I don't think at this stage of the game we're able to give a real valid evaluation of the reading progress. I don't think five months on the machines is long enough to establish validity. The classroom teachers and the ward personnel - we've also had very good reports from the wards, say those individuals whom we have had on the machines and who have had some emotional problems have improved since their introduction to the machine.

We had one boy who was a gang leader. He rejected school attendance. He was to be in our program. He would come maybe one day out of five. He was ashamed of his poor reading ability. We brought him in on the machine. Now he's progressed to the point where he's reading on a level commensurate with the rest of his class (second grade level). He voluntarily reports to school daily, and we are having no more problems with him. We have a girl on the machine. We have tried her in school for five years, every September we try her in school, when classes have started after Labor Day. By the middle of September she was out. The minute the teacher turned her back, she was long gone from the room. We had to scout around the building to find her.

This past year, now I'm not saying this is all the result of the machine, she could have matured some in the meantime, but we have scheduled her program so that she is on the machine the latter part of the afternoon. Usually she behaves. She doesn't leave the classroom any more. She comes down, and I say she usually likes to work on the machine. Some days she likes to work on what the instructor would like to have her work on. Other days she likes to work on what she would like to work on, and we know what that's going to be. It's going to be a story about the Man from Uncle, or the Girl from Uncle. Other days she won't do a thing.

And then there are other times when she sits in the booth. We watch her try to anticipate the machine. She tries to cheat it. She'll be running her finger down the keyboard, but we have gotten her so that she stays in the classroom. And that in itself is quite an event. Now, then, under Title One, we have hopes for a night school program, and once we get that started we're going to have boys and girls between the ages of 16 and 21 who are in our young adult program and who are having reading difficulties, or emotional difficulties. We hope to develop their reading abilities so that they will be successful when they get outside.

The program, as we envision this, will be vocationally oriented. We feel that if we can bring them along, so that they're able to read a newspaper, that we've been successful.

Another thing that we've experimented with has been arithmetic. I don't think this has been too successful, but I don't consider it a complete failure either. In the future we hope maybe we can do a little bit more in experimenting with arithmetic and add another facet to their learning.

Question: May I ask Dr. Goodwin a question? When the children first came to you, how did you introduce them to the "Typewriter?"

Dr. Mary Goodwin: We attempted to do the same thing with all of the children, whether readers, autistic or not. The setting in Cooperstown was very pleasant. There were pleasant people there to receive them. The children were welcome. And we made them as comfortable as possible, treated them as nearly as possible like ordinary children, although with some of the severely ill autistic children, this was not very simple.

Often I was involved at the first visit with the autistic children and led them to the door of the "Talking Typewriter", with the door opened in the booth, and said something simple, like, "Here's a typewriter for you, Michael." And nothing further. I think our biggest surprise was the story of Eddy the first child we ever had. And everybody knows it by now. Eddy was really a very ill and unmanageable child. He'd bang his head on the floor or on his mother's head or against the wall. He chattered gibberish and screamed with a high and penetrating scream, if he was frustrated in any way.

And when he was invited to come we had no idea that he would come. He came. His mother came with him to the door of the room, and then he did come with me, and he hit the key; it was on Phase Two, and he heard the voice and sat down and typed for 20 minutes or so, and left. And it was after he had gone that Mr. Seiber discovered that in looking over the paper that it had famous television words. Here's the copy. Many of you have seen this. But with words like "Liquid Ivory." He was just six. He'd never been to school. "Arid Deodorant," "Downey," "Final Touch," "Liquid," "Mr. Clean," "WNBC, CBS, WDOS, etc." "Hugh." We thought he was saying Hugh Downs.

And on the strength of that, Eddy was invited to return and continued until recently. On his third or fourth visit he went into the booth, and Mr. Seiber and I were there that day, and watching. And he typed nothing except box, taped, wrapped, and then left. Spaced just as you see it. Nobody had shown him how to use the typewriter and this is what he produced.

And then Mr. Seiber made up a little story. This was Eddy's fifth or sixth visit. Once upon a time there was a dog named Huckleberry Hound. Every morning he got up and washed his face with "Final Touch." One day he used "Downey" by mistake and his whole house got filled up with soapsuds. So with bubbles all over the place, Huckleberry Hound got inside one of the big bubbles and looked out. And this was shown to Eddy, and the following day I came into the room and Mr. Seiber said, "Do you want to show Dr. Mary your story?"

He looked at it on the table and turned to the blackboard and as we sat there he wrote the story on the board. And it was that kind of event, just observing this child, that encouraged us to observe rather than do to them. And over and over again this kind of event has happened. I saw it the other day with a little five year old boy who had been considered severely retarded, not acceptable in the Baltimore public schools. It was his first encounter with the "Typewriter," and he went in and sat down. I should say that a psychiatrist had discovered that he was not as retarded as the examination had indicated.

He sat down and typed Awake, Awake and then his name, and then went off in Hollywood squares. This is a child five and a half, I think, who has never been to school, and can spell all kinds of things, many of them direct steals from television. And remember this, that television has taught them by what I call lateral learning. Apply this to the classroom, because if you give information and material, often the children will incorporate it and use it. You won't get it on demand at once, but if you're patient it will come out.

And this is another thing that the "Talking Typewriter" does. It permits this to be restored.

Question: Did you ever use programs?

Dr. Mary Goodwin: We've used them. I personally have used them very little with these schizophrenic children. I have been unable to resist the impulse to try a number of times. But I am not convinced that it doesn't narrow down the way of expressing themselve so that you miss out what they might give you if you did it the other way around. Now I do think there are possibilities in repetition of the sound of the keys as we just heard. I think there is the possibility of developing experience stories. I was intrigued at the idea of pictures and the child. We did try some of that, using local signs, pictures of Cooperstown, pictures of the environment.

We had an interesting summer's observation of a catatonic 15 year old from the state hospital. He progressed from enjoying the booth and a fear of the typewriter, to sort of sneaking up on it and hitting a key. During 30 sessions of half hour he used the typewriter for 12 lines in a very repetitive fashion, two letters alternating. This was interspersed with activities - singing and actually spontaneous conversation.

And I think we would never have seen this if we had tried to show Rickey what the typewriter could do. Maybe Mr. Seiber has something to add to this, because he's one of the three people who was subjected to the experience of for the first time in their lives, seeing severely ill children.

Those teachers were perfectly magnificent, because any of you who are from state hospitals, in this field, know that it's no joke to be subjected to a nine year old boy who is so strong and so quick that in a second he could clear everything visible in a room and throw it on the floor and break it. One child who is now in the state hospital, absolutely mute - a sick and difficult child. Once a social worker, his mother and I had to sit with him strapped in the front seat of a car in order to talk, hold him, in order to talk, and even so he could reach over and grab the stuffing behind the dashboard and put it in his mouth.

But he came week after week for a half an hour or so. And after several weeks he came in one day and leaned back on the table on which he was waiting in the waiting room and said, clearly and loudly, "Nine." His mother and I looked at each other and said nothing. He grabbed my hand and rushed me upstairs to the booth room and did what he often did, which was to indicate he wanted me to take off his shoes and socks, turned out the light in the booth, which he had often done before, and then stood in front of the one-way viewing mirror, mouthing, Nine, nine. And I knew enough only to say, "You can say Nine."

I didn't know actually when his birthday was, so I didn't say, You are nine. And then he came out, took my hand, led me in, and in the dark I had to type nine over and over again. He said it some more. That night he walked around the block with his father and said, Hi, Daddy, and nobody has heard him say one word before or since.

Now something is going on. His sister had a birthday that week, and I made the assumption that he was trying to tell me that he, Paul, was nine. But this is another indication of how little we know, and what may be going on, and if we can provide a chance for them to let us know, maybe we can meet it.

One boy used the typewriter, a non-verbal boy, for four or five months, typing as many as 3,000 symbols at a sitting. One day his name appeared and tab and space on a long sheet of random typing. Then there was the so-called aphasic child, cerebral palsy, supposedly hopelessly retarded, who, by the time we saw him was four and a half and then five; no speech. He usually came dashing in, ran upstairs, typed a few letters, ripped the paper out, ran away. And one day, and again it was good luck, I happened to be there, and he typed M-A-R-T-I-N-C-O-W and went home.

And then speech began to come, and he has now word recognition. He has speech that needs some little help but is clearly intelligible, and if we had been programming along in there, we wouldn't have known when he was ready. And after he had typed his name and now, he would let me just touch his hand while we made a mark on the board. And then he began to make more marks, and then he would begin to make letters and let you help him with letters. Over a period of weeks he began to make letters and words. But at his pace, not ours.

END OF FRIDAY SESSION

SATURDAY SESSION

Chairman: Dr. Benjamin Israel

Chairman: The first thing I'd like to do is thank those of you who took the trouble to come down to Brooklyn yesterday to see our installation. We hope you found some of the things there valuable. In some of the smaller sessions I've indicated to you that we are somewhat out of place, in a sense, because so many of you are involved with smaller operations, and in different types of institutions from the one in which I find myself at the present time.

However, I think some of you walked away with one or two ideas which you thought you might be able to use, if only the green paint to put on top of a few desks, something that you could benefit from. And it's in line with that that I was asked to put before all of you the idea of setting up some kind of user's information pool, possibly a newsletter type of thing, or possibly a quarterly bulletin, not so much in terms of reporting progress or results, as much as putting before other users of EDP equipment some ideas or some formats or some type of programming or some types of forms. You know, the development of an effective form, a report sheet, an evaluation sheet, can tie up one or two members of your organization for a period of time that could be well put to other uses. And there are many of us who have already gone through this.

So the idea generally is to see if we can develop a kind of a sharing pool. Mrs. Litwin and I have spent some time with two or three of the groups and have picked up many ideas from you, people who use one, two or three units in an installation. And we would like to share with you what we have, and if all of us can pool this information, I think we can save ourselves some time.

There is no question but that some of us are caught with certain constraints. For example, in our own particular situation there are programs which we cannot share. They are tied up by IBM and are not eligible or free for distribution or public dissemination. But there are other things which can be shared, and this I think would be a worthwhile thing.

I have with me some copies of some of the individualized programs which we spoke about at the center in Brooklyn yesterday and which were referred to several times in our sessions. These are the little experience charts which were then programmed, slides taken of the little drawings, usually with the kindergarteners and the first graders when we started last year. I have about 25 or 30 of them. You're welcome to them, and if you're one of the lucky ones or unlucky ones who doesn't get one, most of you know where we are in Brooklyn. If you'll drop me a line, I'll be glad to send these out to you.

They're rather slick in certain ways. They are not the kind of thing that could ordinarily be turned out very quickly in a small installation, but we were operating with a different set of guidelines. Is there someone in the group who has a suggestion or two as to how we might be able to make this a viable type of operational thing, or can come up with an idea as to the kinds of things you would like for your center that you might be able to get from someone else? Just one or two ideas. We may be able to bat this around and figure out a way to get somebody at [illegible] to collect, centralize, share. Dr. Shaw, I think you were involved as far back as last August in several requests along those lines, weren't you?

__Dr. [illegible] Shaw__: Yes. I would be very glad to send you the materials, for example, that we have set up like the checklist which we use consistently with every child that goes through. We do have notebooks that might be worthwhile. We have notebooks on the case history of every child. By looking one can see how we started with a child from the beginning, what made us change, what program we used, what specific thing and why. All that is written in. There's about a page a day on each child. But I thought people might be interested in having this kind of thing.

__Chairman__: Well, it's a start, Dr. Shaw. For example, you may recall in one of the sessions yesterday, it was mentioned very quickly and very offhandedly, but there are some people who hadn't considered it: the idea of having a different voice, using a kind of a modified assembly line type of thing. In other words, the person who is doing the actual recording does not have to be the voice who is on the program. You can have an announcer, using the machine for recording, and doing nothing but recording, and then have a voice tape in at another time when the machine is free and put all the voice together in.

Using this method may be valuable in budgeting time. For you who are working with one, two or three machines, this is a very important consideration. So if we could develop some kind of a bulletin, as I say, for your information or the sharing of ideas in which something like this could be put before others, it might be of help to all of us.

Dr. [illegible]: Then are you suggesting that [illegible] become the focus for this operation?

Chairman: Sometimes it works better. So many of us are so busy, we can't spare the clerical help, we can't spare the time and finally get to be one central point through which this is done. [illegible] got some people, I am sure, quite capable of doing this. We can send our [illegible] in, we can send in the kind of [illegible] material in, [illegible], and then in a [illegible] to the one that was set up for the program this year. [illegible] be put out every quarter. But we could take just what we want to.

All of the ideas don't originate in [illegible] and so they originate in [illegible], New York, or in [illegible], and this is the kind of thing I'm talking about. So the answer to your question, [illegible], is yes.

Let me just show you what I mean, if I may. We felt that if we could involve our kids in the development of a magazine or the development of a book, it would be something that would be very real to them. And so we have two of them here. [illegible] This one was developed by the kindergarten group at [illegible] and the other was developed by the first grade. We would like to share this with you. If you'll drop us a line, I'll send them out to you. They are extremely expensive, and may not serve your purposes in the form in which they are here. But they were developed for other reasons.

We are very much concerned with community involvement as part of our [illegible] operation, and for us it served a very important purpose and was well worth the cost. These books were developed under my professional [illegible] came in to have rather than [illegible]. But I [illegible]

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Chairman: For example, the first one I will send in to you will be the evaluation sheet, the evaluation profile sheet of the effect, the work of our paraprofessionals. Now you may find some use for this; you may not find any use for this. But it took us several weeks to develop this thing in terms of rating them. I've got 30 people in there, and I've got to have some evaluation for them and of them. Now you may not be able to use the entire form, but if there is something you find useful, this is something we developed that the government does not place constraints upon, and you're welcomed to it, by all means. We would like the same from you.

Woman: In the group that I was in, there was some interest expressed in having a list of new installations in the vicinity of your own particular one so that you could contact them, and we could keep a list of this sort going and available to you.

Chairman: Yes sir, Mr. Hirn?

Mr. William J. Hirn: Why don't you start off at the beginning? After visiting your installation, for example, your little challenge in terms of saying this is a creative idea because anything that I would have seems so really small in comparison. Why couldn't we start off with profiles, or something concerning administration where everybody has an idea and yet you feel as though what you've got to offer may be of some value and isn't asking a lot of creativity. It seems to me many of us are so new in this that we at this particular point really are unsure of what is of value and what isn't of value.

Chairman: Mr. Hirn, can I answer this in one way? Do you get visitors at your operation?

Mr. William J. Hirn: Certainly.

Chairman: All right. We get thousands of them, as you well know. Now one of the things we found that would cut down on administrative time and save us an awful lot of grief was the preparation of that profile yesterday, so that we can give this to people as they come in, let them read it for five minutes, and then the pitch or the spiel that we give in terms of explaining our operation can be cut down considerably and the questions that come up do not have to be related to costs or physical layout or how many people have you got, or what are the classes you've got of that kind of thing.

They can be more closely involved with rationale, with process with other ideas. So that if - all right, we developed a five page one, because ours is kind of large, so that if you developed one of these little profile sheets for your visitors and hand them to them as soon as they come in, you're going to save an awful lot of time for yourself. Now is this a concrete suggestion for you?

Mr. William J. Hirn: Certainly. But what I was saying - just to get the newsletters going. I'm afraid that like so many of these things I've participated in where we all agree - different organizations, different groups say, We'll have a newsletter - they just don't materialize. For example, at one time you say, allright, let us all say that the theme will be: What are our ideas concerning the writing of a profile? There are certain points concerning yours or somebody else's that I would certainly find applicable. The theme for the first two or three newsletters, this might be. From then on, people would feel rather free to send in ideas on a free flowing basis.

Chairman: Suggestion well taken and in order. Lila?

Mrs. Lila Carol: Rather than get hung up on this newsletter idea, I think we've got the feeling from you all that this is something you'd like, certainly all the techniques and the technical details will have to be worked out. If we could just extract a promise of help from you, we'd appreciate it. And one other thing, remember, you do have a customer services department here, and our personnel are out at your installations as often as you want them. They certainly can talk to you about these things, and when you come to some conclusions about what you want to send; if you've got material, we'd like to go into it. If you will send it to REC at 200 Sylvan Avenue, you can sent it to Dr. Milton Katz. We'll take if from there.

Chairman: Thank you. Ladies and gentlemen, are there any more questions, because we have a program set for this morning? There are a couple of other important things you'll be subjected to this morning, quite pleasurable, I am sure. But if there are no more questions, I'd like to bring this phase of it to a close. We've gotten a commitment. We know we're going to cooperate. And Mr. Hirn, this operation and this group operates differently from any other group you've ever been involved with. Everybody's going to put out for this one. I think it's important. So let me thank you for your time. Let me thank those of you who visited us yesterday - those who didn't, incidentally, if you'll get in touch with REC or you'll get in touch with us directly to make an appointment to come down and spend a little time with us, it's part of a family; we would welcome you.

Mrs. Lila Carol: Now we go on with a very special part of our program. We have with us a gentlemen who has been associated with Responsive Environments, who cut his trip to England short and flew back last night so that he could be here this morning to introduce a major speaker of this conference. I refer to Mr. Richard Kobler who is Vice-President of Thomas A. Edison Industries Laboratory, now a division of McGraw-Edison Company. For those of you who may not know - and I don't think there are too many of you - Mr. Kobler is a prolific inventor who holds many patents, particularly in the area of educational technology, He is the co-inventor of the "Talking Typewriter."

Mr. Kobler, too, and very important to us, is a member of the Board of Directors of Responsive Environments Corporation. I'd like to call on Mr. Kobler now to introduce our speaker, Mr. Kobler?

Mr. Richard Kobler: Well, everybody in this audience would regard the task of introducing the next speaker as a most enjoyable one. And, of course, so do I. But there are disadvantages to such an introduction. I like to introduce unknown people, people who are on their way up, because few people know anything about them, and you can say a lot about them. On the other hand I am introducing here the Encyclopedist, the Goethe of Behavioral Sciences, and I shall relieve you immediately of the worry that I am going to talk for any length of time. Encyclopedists usually are not of the most creative type, and very few - and Joe McVicker Hunt is one of them - are those very rare examples of Encyclopedists who are also creative. The second thing to remember about McVicker Hunt may sound sarcastic - and it is. And it is meant to be. The academic world has a way of looking at children which is more paternalistic than probably any other community. In Joe McVicker Hunt we have a man for whom the children are probably the greatest thing that ever happened or will happen in this universe. His respect for the children, his respect for their way of doing things, and not for our adult we impose upon them is unbounded.

Now with this I shall tell you what it says on this card I was handed: "Mr. Joseph McVicker Hunt, psychologist, mover and shaker of explorers of young children's cognitive biases, professor at the University of Illinois, director, National Laboratory of Early Childhood Education at Urbana, also creator of the influential treatise, Intelligence and Experience, among many other publications."

It is obvious that this card reveals only an atomistic portion of Joe McVicker Hunt and that my own remarks haven't stated it much better. Let the great man talk for himself.

Thank you very much.

Mr. Joseph McVicker Hunt: Thank you very much, Richard

It is hard to follow an introduction like that. Richard Kobler is one of my favorite people. He is not only an inventor, but he is a citizen of the world and a humanitarian full of concern and enthusiasm for all kinds of things humane. In this concern of his for things humane, he is almost the opposite of our stereotype of the engineer, which he also is. But Mrs. Carol has told you that the fun is over now, so you must listen to me. It must be an awful come-down to listen to someone like myself after he has been built up by an introduction like Richard's.

You people are engaged in an enterprise of tremendous humane and social importance. Your effort is part of the response of our society to what, in the terms of Toynbee, is the challenge of incompetence in our increasingly technological culture.

Historically, there are two main general traditions for improving the quality of human beings. One of them is euthenics, and the other is eugenics. By eugenics I mean using the educational process to improve man. This consists in controlling the circumstances encountered by infants and children, which, in turn, govern in considerable part the course and rate of each individual's development. By eugenics I mean the approach that consists of choosing the parentage of succeeding generations.

The idea of euthenics is old. It goes back at least to the days of ancient Greece and to the writings of Plato. I have fancied that I knew something of the history of the euthenic tradition, but I have learned things new to me from people associated with your Responsive Environments Corporation. A few years ago, I spent a whole winter reading the history of thought about child-rearing and education. I did it in order to prepare myself to write a historical chapter on early experience and the development of intellect and motivation. In the course of this reading, I examined a large share of what Plato wrote, but I did not get to his book "The Laws." When Richard Kobler came to visit me about three years ago, he mentioned that he was a Platonist. This startled me, because I could not imagine that he was thinking of Plato's theory of how we know, namely, by intuitively laying hold of truth -- a conception of becoming informed about the world which probably lies behind the religious notion of revelation. To be sure, he did not mean this at all. He said he was a Platonist because, in Book VII of The Laws, Plato ascribes a highly important role to early experience in psychological development -- even that development which occurs before children have learned to speak. Richard's remark prompted me to pull down immediately the collection of Plato's writings. If you have never read the last page of Book VI and the first ten pages of Book VII in The Laws, I commend them to you. It was Richard Kobler who brought these pages to my attention. In my examination of the history of the euthenic tradition, I have read those portions of the Sayings of the Fathers, but last night, David Levington brought to my attention that the Talmud is rich with ideas about the role of education in the development of people. There, David Levington tells me, one can find an appreciation not only of the role of very early experience in the development of ability and conduct, but also the conception of Skinnerian reinforcement, and the essence of various other principles of children's learning that we consider very modern. Someone should examine the Talmud for the purpose of documenting this ancient origin of our contemporary conceptions.

In my explorations of this history, I have found evidences of ancient educational wisdom in both the Politics and the Nicomachean ethics of Aristotle, in the Moralia of Plutarch, in Quintilian's Institutes of Oratory, in the Confessions of St. Augustine, in the writings of such leaders of the Medieval Church as Maurus, and in the Letter to the Mayors and Aldermen of All the Cities of Germany in behalf of Christian Schools by Martin Luther. Their trade in the Eleventh Century had made it important to learn how to do arithmetic and to write in order to make records, Martin Luther's reformation made it important to learn to read in order to give each individual direct access to God's word in the Bible and thereby to salvation. Ideas about education which seem highly modern may be found in the works of Montaigne and Comenius. These philosophers of education, and another, John Locke, conceived of education beginning only after children were talking and ready for school subjects. Expecially important in our modern concern for early childhood education is Rousseau. Before Rousseau, the little human animal was conceived in Christian thought to be full of original sin. It was this concept of original sin that justified punishment as a way to motivate learning to read in the schools founded by Luther and Calvin. In his famous discourse on the issue of whether the arts and sciences have improved morals, Rousseau reversed this notion of original sin by contending no infant could do evil because each comes directly from God. This contention is the basis for the notion of the noble savage, and the notion that evil comes through man's education. In Emile, his treatise on education, Rousseau also put a new emphasis upon very early learning and upon the idea that one can avoid evil in education by permitting the child to learn through their naturally motivated playful activities. This philosophy of education underlay the work of Pestalozzi. Pestalozzi was a teacher of Froebel, the founder of the kindergarten movement. Rousseau also appears to have had a good deal of influence on the materials-centered approaches to early childhood education of Itard, Seguin, and Montessori. It is worth noting here, perhaps, that the Talking Typewriter derives, at least in part, from this tradition of early childhood education.

The switch in belief and emphasis from euthenics to eugenics came in the middle of the Nineteenth Century. This switch has roots in the debates over preformationism and epigenisis, but the demise of faith in euthenics came about in the course of the debates over Darwin's theory of evolution. According to this theory, as you will recall, evolution comes about as those survive within any given ethological niche, breed, and in turn, give rise to the next generation of the species. This survival of the so-called fittest is a basis for evolution because wide variation exists even within those coming from any parental gene pool. The demise of faith in euthenics, and an abortive emphasis on eugenics, came about through interpretations of this theory of evolution. It was Sir Francis Galton, Darwin's younger cousin, who saw in his theory quite an unnecessary implication that traits, including competence and intelligence, are essentially fixed and predetermined by heredity. In order to document the fixed nature of traits, Galton did his famous study of the inheritence of genius wherein he found that if one takes the families in Who's Who from any given generation, they give rise to a much larger proportion of the next generation in *Who's Who* than come from the rest of the population. Left out of account in this famous study of course, were the especially favorable circumstances and opportunities afforded the children of those in *Who's Who*. Sir Francis Galton also invented the first attempts at measuring behavior, namely, his anthropometric laboratory. If one reads the background of Galton's life, one gleans that his purpose in founding this laboratory was based upon the hope that his tests would provide a basis for selecting those who should be selected to become the parents of the next generation. Galton also founded the Eugenics Society and movement. This test never caught on. As a matter of fact, the kinds of tests that Galton invented were uncorrelated to any of the indicators of competence, of productivity, and of quality of life in which he was most interested. It was the tests of Binet, whose aim, ironically, was to improve the education of the mentally handicapped, which finally did catch on.

Darwin and Galton, and J. McKeen Cattell -- Galton's student from America -- are important sources of the beliefs in fixed intelligence and predetermined development which have been dominant during the century now ending. Another individual who is very important in making these beliefs that would justify a eugenic approach to improving man was G. Stanley Hall, the American psychologist who founded Clark University. He saw in the *Origin of the Species* and in Darwin's other writings, the notion of recapitulation. This notion he used to justify the belief in predetermined development that he passed on to his students. According to recapitulation, each individual goes through in at least synoptic fashion the whole course of development through which the species of the race has passed. Hall viewed behavioral development as an epigenetic process which should not be interferred with by educational practices. This view he epitomized in his parable of the tadpole's tail. If one cuts off the tail of a tadpole, the hind legs fail to develop. From this, G. Stanley Hall drew the implication that one should never interfere with any behavior of a child lest the child lose thereby the basis for subsequent development. Hall's influence was great because he taught those who became the leaders of both the intelligence-testing movement in America. It was Hall who taught Arnold Gesell, the developmental psychologist who gave us the normative approach to developmental psychology.

We still face many of the consequences of these traditions in developmental psychology. For one, the teachers typically see an explanation of their teaching failures in test scores of the children. When you ask a teacher how her disadvantaged children are doing, if she knows that their test scores are below average, she is very likely to reply, "as well as can be expected." The belief in predetermined development deprives the failure of children to learn from being a stimulus to try harder and to alter teaching methods. Probably nothing is more detrimental to improvement in the educational process than the teachers acceptance of failure because "children are doing as well as can be expected."

During the 1960's, we have been changing our collective minds about fixed intelligence and predetermined development. We have been changing our minds in part as a consequence of the findings from the investigations of behavioral scientists. Our behavioristic pioneers invented a methodology that, in its objectivity, has a way of developing misconceptions. Sometimes these misconceptions are the very conceptions that help create the methodology. Like my own aphorism that stimulus-response methodology is the destroyer of stimulus-response theory. Even my Skinnerian friends are beginning to admit the existence of central processes -- that something important is going on between the ears.

We have also been changing our collective minds about what controls psychological development because we live in a period when it is exceedingly important to prevent incompetence. The burgeoning technology of our society has tremendously increased the demand for those who can skillfully use language and numbers, who can solve problems with these symbolic skills, and who are motivated to solve these problems and to accept social responsibility. In fact, such problem-solving skills and such motivation define competence. About the same time that the demand for people with competence has grown and increased tremendously, the demand for those lacking competence has decreased dramatically.

On the side of increasing demand for those with competence, it appears that there are about three jobs for every new young Ph. D. How different this job situation is from that present when I came out with a new Ph. D. in 1933. I heard of only one job in the first three years that I was out. If the National Research Council had not given me a post-doctoral fellowship, I would have either starved or gone back into something like the life-insurance business which I had left as a part-time salesman while I was still a college student. What a difference. What a wonderful difference!

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children. At the University of California at Los Angeles, Maltzman and Raskin have found t'at stimuli to which the orienting response has been habituated will not serve as cues for conditioning. In other words, with habituation of the orienting response, a given change of receptor in put loses its cue value. Inasmuch as children of the poor are often exposed to a great deal of intense stimulation which lacks significance in the sense that it leads to something else, I suspect these children become habituated to the loud voices, and the commands which are repeated with no follow-through. Both Cynthia Deutsch and Vera John have uncovered evidences that socially disadvantaged children fail to discriminate verbal inputs. Habituation of the orienting response to such inputs may be the explanation.

Evidence of plasticity in very early child development from a second source outside our traditional categories of learning comes from the work of White and Held at the Tewksbury State Hospital in Massachusetts. This work is concerned with the development of visual attention and eye-hand coordination. At the Tewksbury State Hospital, infants are available for approximately their first six months of life. White and Held measure visual attention simply by putting a baby in an infant seat surrounded by objects. They watch him and clock the proportion of time that the infant is looking at something. Now the development of eye-hand coordination has in it a series of discernible landmarks. I shall talk about only two. The first is fisted swiping. If one presents an infant with a multi-colored object, placing it within about 10 inches of his eyes, he becomes very excited; his fists go up and around but they do not directly approach the object, and he does not open his hands for grasping it. This first landmark is called fisted swiping. At the terminal end of the development of eye-hand coordination, when the colored object is presented to his view, the child reaches directly for it and shapes his hand in anticipation for the grasping. This is top-level reaching.

White and Held use an interesting research design in their work -- one that I suspect may be useful in developing uses of the Talking Typewriter. In the Tewksbury Orphanage, they started with a simple, normative study in which they recorded the age at which the various landmarks in the development of eye-hand coordination appeared while this sample of babies were developing under the traditional regime. This, in a sense is their control group. The ages at which infants reach the landmarks with various enrichments in the regime provides the basis for assessing the effects of these enrichments. Now there are defects in such a design. Factors other than the enrichment may occur along with the enrichment. On the other hand, this sequential design avoids the prevalent tendency for caretakers to imitate for their control groups the various enrichments perscribed for the experimental groups when the two are reared simultaneously. In a study at the Crech Orphanage in Beirut, Lebanon, Dennis repeatedly observed that caretakers imitated for their control infants the enrichments provided for the experimental group. In the studies going on at Tehran, Mrs. Minou-Archer and I have, for this reason, planned to use the sequential design. I suspect it would be useful for those of you attempting to improve upon uses of the Talking Typewriter.

Now the evidence of plasticity in the work of White and Held is as follows. In their original normative study, the fisted swiping appeared at a median age of 65 days; and top-level reaching appeared at a median age of 145 days. In the group exposed to their first, massive enrichment program, again involving 20 infants, the median age of fisted swiping was delayed a week to 72 days, but the median age of top-level reaching was decreased from 145 days to 105 days. This massive enrichment program had in it three elements. One element consisted of handling the infants for some 20 minutes a day, and this was done because Denenberg and Leving hal found that handling rates hastens their development. The second element consisted of putting the baby on his tummy after each feeding, and this was done because Dennis had suggested that the effort of raising the head and looking around might be very important. These first two elements were initiated when the babies were two weeks of age. The third element, and the one which was probably most important, consisted of putting a complex stabile over the crib, right above the baby's face, for him to look at. This stabile consisted of a red and white plastic rabbit with a monkey sticking out, with a mirror, and with two lateral sticks ending in balloons. It was really quite a complex affair. It was placed over the cribs when the babies were 37 days of age. The fact that it depressed the development of visual attention, and the fact that the babies in this group cried more than those in either of the original control group or later groups, suggest that it was too complex for the infants' comfort. Because it sub-tended approximately 60 or 70 degrees of their visual angle, the infants had a hard time escaping. Nevertheless, when the infants reached about 70 days of age, the curve of visual attention was accelerated markedly. The infants became interested in the stabile. It is presumably this interested looking at this complex stabile that served to reduce the age of the top-level reaching from 145 to 105 days.

On the assumption that the original stabile had been too complex, White and Held repeated their enrichment study. Beginning at approximately two weeks of age, they placed on either side of each crib a white disc six inches in diameter with a red nipple in the center. They had arranged this red nipple so that an infant could reach out and pull it to hismouth, but none ever has. Nevertheless, the infants feel it and strike it to some extent as they watch it. This group showed a much more rapid rise in visual attention than either of the two former groups, and the median age of the fisted swiping was reduced from 72 days to 55 days. The handling and the placing of the infants on their tummy after feeding were continued, but it is the fact that the hastening of eye-hand coordination and attention is associated with the change in the objects provided for the infants to look at that leads me to guess that the receptor input is the most important factor in their enrichment program.

In this second enrichment program, they used again the complex stabile, but only after the infants had become about 55 days of age. As a consequence, the median age of top-level reaching, which had been reduced from 145 days to 105 days with the massive enrichment program, was further reduced to a median of 87 days by this second enrichment program. Note that in the terms of the traditional IQ, mental age divided by chronological age, this decrease in the median age for top-level reaching from 145 days to 87 days constitutes an increase of 66 points for this particular coordination. Here, then, are two sources of evidence of plasticity, sources of evidence that environmental circumstances encountered can modify the rate of psychological development, which can hardly be included within the domain of any of our traditional categories of learning.

A third evidence of plasticity which falls outside the traditional forms of learning comes from our own laboratory. For several years, we have been placing stabiles and mobiles over the cribs of home-reared infants for the purpose of verifying my hypothesis that an interest in the familiar comes before an interest in the novel. Because White and Held had related the development of the blink response to the development of visual accommodation, we asked whether the experience of looking at our objects over the crib might be hastening the age at which the blink response appears. In the summer of 1966, David Greenberg and Ina Uzgiris got the mothers of ten newborn infants to agree to put a stabile over the cribs of their infants for at least a half an hour each day, beginning when their infants were five weeks of age. Simultaneously they got the mothers of another ten infants to agree not to put a mobile over the crib until their babies were at least 13 weeks of age. For each of the infants in these two groups, the presence of the blink response was assessed by dropping a red and white bull's-eye target through various distances, with the target fixed in a pair of plastic plates one foot apart. This contraption was placed over the crib, and the lower plastic plate prevented any air from striking the baby's face. The criterion of the presence of the blink response was a complete blink of both eyes in at least ten out of twelve drops of the target. For the group with stabiles over the cribs, the average age at which the blink response appeared for drops of eleven and a half inches was seven weeks. For those infants whose mothers avoided putting anything over the crib, the average age of the appearance of the blink response, for these same conditions, was a 10.4 weeks. This again is a substantial hastening of developing. It would appear that use of the looking schema hastens the development of the accommodative mechanism upon which the blink response is based. This finding appears to fit Piaget's aphorism that "use is the aliment of the schema."

A fourth body of evidence appears to indicate that the receptor inputs from active looking and listening are more important in early psychological development than we have been accustomed to thinking that they are. This body of evidence, moreover, is beginning to show the nature of the physiological basis of the memory storage, or of what, in Herbart's term of a centurn and a half ago was the "aperceptive mass."

This body of evidence which I wish now to synopsize has its origins in several theoretical sources.

One of these sources is the theorizing of Donald Hebb of McGill University. In Hebb's theory, the central processes, representative of objects and sequences of events, rise through perceptual contact with those objects and events and take the form of "cell assemblies" and "phase sequences." This theory prompted one of Hebb's colleagues, Austin Riesen, to rear chimpanzee infants in the dark at the Yerkes Primate Laboratory. When the first pair of such infants were tested after 16 months in their dark nursery, their pupils would react to light, but they failed to recognize objects, failed to blink to approaching objects, failed to recognize even such highly familiar objects as a nursing bottle, failed to fear strangers. Moreover, the retinas of these young chimpanzees, when examined through an opthalmoscope appeared to show a pallor. I was seated by David Krech when Dr. Reisen reported this work. Dr. Krech has been a Gestalt psychologist. When he heard the news of the pallor, he gave the ironic criticism that the findings had nothing to do with perception, that they were physiological. This criticism is ironic, as you will see momentarily, because David Krech has devoted more than a decade of his life since that time to related investigations. In these two chimpanzees, their behavioral deficit was irreversible, and it did indeed turn out to have a physiological basis. Then, about a decade later in 1961, when these chimpanzees were killed and their retini were examined microscopically, Rasch, Swift, Riesen, and Chow discovered a paucity of cells in the retinal ganglia and also a paucity of mueller fibers. Now these mueller fibers are myelin. In our traditional view of behavioral development, myelinization of tracts was presumed to be a matter of heredity-controlled maturation, and behavior was presumed to unfold as the tracts of the nervous system mediating it matured. This finding by Riesen and his associates strongly suggests that myelinization is at least in considerable part a function of receptor inputs.

Another theoretical source of such work has come from the Scandinavian biochemist, Hyden. According to Hyden's theory, memory-storage depends upon the formation of ribonucleic acid (RNA), that this storage involves interaction between myelin and brain cells. This theory prompted Brattgard, one of Hyden's students, to rear rabbits in the dark. In 1952, Brattgard reported that those dark-reared rabbits showed a paucity of both neural cells and mueller fibers in the retinal ganglia, and also a lesser amount of RNA. Since then similar results have been found by Weiskrantz with cats and by Lieberman with rats. What these findings seem to say is that depriving an organism or an opportunity to use such a major receptor system as vision leads to a failure of the development of the physiological equipment required for efficiency of this system.

Conversely, enrichments of the opportunity to use the visual system and other systems appears to encourage the development of the neural anatomy mediating the functions. One source of such evidence is the work of Bennett, Diamond, Krech and Rosenzweig of the University of California. They have used rats for subjects. They have compared the thickness of the cortex and the level of acetylcholinesterase activity in the cortexes of rats reared in complex environments with those of litter-mates reared in limiting laboratory cages. By complex environments, they mean a large cage which is well lighted and which contains a variety of objects for the animal to see and manipulate. Both variety of receptor input and variety of manipulation are limited in the laboratory cages. Those rats reared in the complex environment average thicker cortexes and a higher level of acetylcholinesterase activity than their litter-mates reared in the laboratory cages. These rats reared in the complex environment also solve maze problems substantially more readily than do their litter-mates reared in the cages.

Evidence coming from the laboratory of Hyden also indicates that enrichments of circumstances prove to increase the RNA production of neural nuclei especially involved in activities receiving special practice. In one of these studies, for instance, Hyden and a collaborator had rats learn to climb a guy rope on a pole to get food. Becoming skillful at this activity involved developing excellent balance. The neural nucleus especially involved in such activity is Diter's nucleus. Hyden and his colleague found that RNA production in these nucleui of animals practiced in the climbing activity was greater than that in their litter-mates who had gone without such practice.

Putting all this together, it looks to me as if the nature of the neural physiological basis for what Herbart once called the aperceptive mass is beginning to be uncovered.

The work underway in my laboratory at the University of Illinois on Ordinal Scales of Infant Psychological Development seems to me to be relevant here. Let me use the scale of visual following and object permanence which Dr. Uzgiris and I have developed to exemplify what I mean. Object permanence is the term that Piaget has used, his observations have inspired the work that Dr. Uzgiris and I have done. At birth, an infant will fixate an object briefly if it is placed directly in front of him and about a foot from his eyes. If one moves the object on which he is fixated, he follows it with his eyes through a very brief arc. A few weeks later, he can follow the object through a wider arc, and during the second month he can follow it through an arc of 180°. On the other hand, if the object is taken out of his view over the edge of a crib or a testing box, his eyes wander away from the place where the object disappeared immediately. At this stage, the infant is incapable of playing such a game as peek-a-boo. A few weeks later, when the object fixated upon is put behind a screen, the baby will look at the place where it has disappeared for some time, and will show a certain amount of excitement when it reappears. At this point, an infant will also recover with his hands a desired object which is half-covered. On the other hand, if the object is completely covered, he makes no effort to uncover it. Somewhat later, and the age can vary greatly depending both upon the baby and the circumstances he has encountered in the past, he will go to a good deal of effort to pull off the screen which covers the disappeared object. In other words, the infant appears to have acquired the capacity to hold an image of a perceived object through time. This is what is meant by object permanence. Still later, the infant can recover an object covered by several screens. After more living and looking and manipulating of things, the infant comes to a point where he can follow an object through a hidden displacement. That is, I mean that the examiner can put the desired object in a box out of sight, then place the box under a screen, drop the object there, and bring the box back empty. At one point, the child looks in the box and immediately gives up. Later, the child looks in the box, sees the absence of the desired object, and turns immediately to the screen under which the box was placed momentarily. If the examiner places the desired object in the box, and then hides it successively under a series of screens, the infant will look for the desired object under the screen in the order followed by the examiner. Still later, the child will go to the last screen under which the box with the desired object disappeared, and look there first, and proceed backwards through the series of screens under which the box disappeared. Thus, it appears that the infant comes to a point in which he can play his representative central processes backward as well as forward. It is at this point that children also tend to imitate models which are no longer present and to solve problems by means of mental combinations without manual manipulation.

We are using such scales to assess the consequences of orphanage rearing in Tehran. Although the results are still very few, my collaborators in Iran report that these landmarks of transition in the development of object permanence typically occur much later in orphanage-reared children than they do in the home-reared children on which we developed our scales.

Evidence of such marked plasticity in the rate of psychological development during the early months and years is highly consonant with the evidence of such marked variation in mean IQs as Dennis has found among typical groups of children from some 14 cultures over the world. Although one cannot rule out some basis in heredity for class differences in intelligence and perhaps for race differences, so long as poverty is associated with circumstances which fail to foster psychological development in the young, it is no longer tenable to believe that the relative incompetence of children of the poor at the time they typically come to school is inevitable. Moreover, it is extremely damaging for teachers to accept their failures because "their students are doing as well as can be expected from their test scores." We need better teaching methods, and insofar as the Talking Typewriter can improve upon teaching, it helps them meet the challenge of incompetence.

Now I would like to turn to what I call intrinsic motivation and its role in psychological development. It is such motivation that O. K. Moore was attempting to utilize in his use of the typewriter to get children to learn to read and write.

The theory of intrinsic motivation departs radically from the conception of motivation which has been dominant for the past half-century. According to this dominant conception of motivation, dominant because it was held both by the psychoanalysts and the behaviorists, conceived of motivation as drive. Drive was conceived to derive from painful stimulation, homeostatic needs, and sex or from innocuous inputs which had been associated with such primary drives. According to this theory, organisms remain quiescent in the absence of such drives.

Since World War II, evidence from a variety of sources has called this traditional theory of motivation into question. Organisms do not become quiescent in the absence of drives. From Frank Beach's review of the work on play, one gleans that young organisms are most likely to engage in playful activities when they are well-fed, free from pain and discomfort, or the threat of these.

and too, presumably, in the absence of any new drive. Harlow has shown that monkeys will return over and over again to the three-device puzzles in the course of a day even though they are well-fed, and comfortable and even though they receive no reinforcement other than the opportunity to manipulate the device. In Butler's laboratory, moreover, Butler has shown that monkeys will learn fairly complex problems merely to get a look at what is going on outside their cages or to hear a variety of sounds. In other words, there is a system of motivation inherent in information processing and action. Moreover, as I see it, this system of motivation is extremely important in psychological development.

In the course of psychological development, this motivation inherent in information processing and action undergoes an epigenesis -- a change in its basic nature. With a newborn infant it is, indeed, chiefly a responding organism. The newborn responds to painful stimulation, and to such homeostatic needs as hunger and thirst. In stressing the importance of intrinsic motivation, I do not wish to deny that these basic drives exist and are important. But the newborn infant also responds to changes in the character of the input through the distance receptors: the eyes and the ears. As I have already noted, his response consists of arousal and orienting to the source of the input.

It is interesting, I believe, that when Lipsitt and his collaborators show the effects of reinforcement in infants who are only a month or two old, he shows these effects on the capacity of a given change of input to evoke some specific overt activity. It is in this sense that the very young infant is a responding organism. Later the infant becomes an initiating organism. My Skinnerian friends are content to call actions which appear to be infant-initiated without external stimulation "operant responses." They seem to be uninterested in the process by which operants come into being.

From two sets of observations, I have gleaned the proposition that these self-initiated activities emerge from the infant's perceptual encounters with his circumstances. Jean Piaget is the source of one of the sets of observations. From his observations of his own children, he noted that at roughly four or five months of age, they began acting in order to retain or regain perceptual contacts which he termed "interesting spectacles." These interesting spectacles

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of receptor input and goals of action. This interest of the older infant in what is novel and more complex appears to motivate a genuine imitation. It appears to motivate the efforts to vocalize new sounds, and to make new gestures. In fact, Dr. Uzgiris and I have been able to develop two ordinal scales of imitation, one for vocalization and the other for gestures. In the development of these scales, we have observed behavior that appears to indicate a great deal of importance in what we may call an optimum of novelty and complexity. If the model to be limitated is so simple as to be "old hat," it is hard to keep the infant interested. On the other hand, if the model is too novel and complex, the infant becomes emotionally disturbed and angry. I suspect genuine injury can result from demanding, either with punishment or reward, imitative behavior of problem-solving which is beyond the limits of an infant's accommodative capacity. John Holt, the author of *Why Children Fail*, has reported a poignant illustration of the consequences of presenting a child with a model beyond his own limits. In this case the child was a little girl of three. She had a plastic toy flute. She enjoyed making noise on it until her father took it up one day. Quite unwittingly, the father who had some musical skill, explored the possibilities of getting a scale on this little toy instrument. When he succeeded, he turned to playing a tune. The little girl watched and listened to her father wide-eyed. When he returned the flute to her, however, she threw it in the corner and would no longer have anything to do with it. What I am trying to point out is that circumstances can be made too complex and novel for a child. Yet, I have no fear of enrichments, so long as the infant or the young child is free to take them or leave them according to his own inclination.

This matter of optimal novelty and complexity comes under what I have been calling "the problem of the match." It is a problem which is best solved, I suspect, by observing children for behavioral signs of interest and surprise. The genius of Maria Montessori appears to reside in her capacity to observe children for such signs. I was introduced to Montessori by Jan Smedslund. In the summer of 1962, Professor Lee Cronbach and I had spent a day with Dr. Smedslund at the University of Colorado. At the end of the day, we returned to Smedslund's office, he pointed on his desk to a copy of E. M. Standing's book entitled *Montessori, Her Life and Work*. He turned to me and asked, "do you know that book?" When I said, "no," he replied, "you should know about Montessori. She has a solution to your problem of the match. It is not a theoretical solution, but it is a practical one."

Montessori did indeed have a practical solution to this problem of the match. I still like her approach to the motivation of education in children. Her choice of materials provides young children with many different kinds, each of which is graded in complexity. Moreover, by including within her schools children ranging in age from three to seven, she provided the younger ones with models which are graded in complexity, and she provided the older ones with the opportunity to learn by teaching.

On the other hand, there are real defects in the Montessori system where culturally deprived children are concerned. The very fact that children work with materials means that language tends to be minimized, and a deficit in the linguistic domain is characteristic of these children. Your "Talking Typewriter" might possibly provide a correction for this defect in the Montessori system. I am not fully confident, however, that the Montessori system is fully adequate to cope with the motivational problems of culturally retarded children. The development of intrinsic motivation can be hampered and deformed by combinations or reward and punishment to more potent systems of motivation. When this has happened, it may be necessary to undertake what I tend to think of as therapy in which one resorts to reinforcement for productive effort by M & M's or by various other mechanisms selected for their effectiveness with the individual child. I believe a teacher has failed however, until she has got a child interested in the educational process for its own sake. Once this is achieved, children will educate themselves if they are given half a chance.

I have talked longer than I should have. I have tried to show with summaries of the evidence why the notions of fixed intelligence and pre-determined development are no longer tenable. I have tried to show despite the all-importance of the genotype, psychological development is a highly plastic affair in which the circumstances that a child encounters can make a very large difference in his rate of development and his final level of development. I have tried to suggest that the incompetence all too common among children of the poor, be they white or black, is not inevitable. I have tried to suggest that, given our burgeoning technology which is dramatically reducing the demand for those without symbolic skills, it is highly important to do something about early childhood education to prevent incompetence. In the words of John Paul Jones, "We have just begun to fight!", we have just begun to respond to this challenge of incompetence that comes with poverty.

Thank you very much.

Chairman: We're happily behind schedule. To respond to McVicker Hunt would take more minutes than we've got. I do think the applause for a person speaks repeatedly in a language all its own. And you've got that extra wave that says, "We liked it and enjoyed it and we are proud to have listened to you."

In the introduction to Montessori, the edition, the preface is by J. McVicker Hunt. It is the single most impressive piece of writing on education of infancy and the translation of research findings that I know of. The only thing that exceeds it in value and in competence and in scope is another piece J. McVicker Hunt published in 1965.

I am under obligation to you in that our program indicated to you that we would finish at noon, and I recognize the conflict, within me. I will accede at this point to some extension of time, and ask Dr. Hunt if he'll remain after we finish this part of the program for those of us who would like to sit and talk more with him in a less formal setting.

We will now spend another very, very important hour in examining consequences, inferences, possibilities for the "Talking Typewriter" and the whole concept behind it. It seemed to me that we are now ready to begin at that stage and I'm champing at the bit out of my own personal feeling that this is what we need to do.

May I ask the representatives of the various discussion groups to reduce what you have to say to as sharp and as brief a statement as possible. I won't say four minutes or three minutes, but frankly, if you can do it in a package almost epigrammatic in style, I would be appreciative of it.

Mr. Hirn on my furthest left and Mrs. Kant, Mrs. Clary, Mrs. Taylor, and Mr. McPeek; and I ask you first, Mr. Hirn, to report.

Mr. William J. Hirn: All three groups concurred on five basic points concerning REC support. Conferences should be held on a regular basis although there seemed to be some doubt as to what the procedure should be. Should it be on an interest level, should it be on a geographic level, should it be a one day conference instead of two and one half days as now?

Could it also be possible that REC come to our individual installations saying that this is an individualized type of a conference day? The newsletter was a package deal, before Dr. Israel spoke this morning, because all three groups did concur that they thought it was a very fine idea. They felt that we should share information that we can get from our various installations; that it would be a wonderful opportunity for REC to continue an in-service type of an extension service to the various installations; that it would be a marvelous source of information in reference to helping the unusual child especially.

We seem to concur on the point that REC should make available profiles of present and future installations with such information as location - what the various installations are trying to do, research, remediation, development approach, come what may - the types of students that the various installations may be servicing; the types of programs being developed of used, the physical setup; the administrative procedures; information on designs and philosophy of the particular installation.

There should be a continuing type of training program by the company but it should also be extended with more information, more philosophy, more the psychological background at the very beginning of the program so that we're not just entering into it with the machine and trying to find a program that we can feed to children. There should be a longer training period and it should be at a slower pace. The personnel should be present also when the first children are introduced to the program, to the machine and the program.

There should be some training in evaluation of what we think we are doing. There should be training in developing programs and there should be some training in making slides. This seems to be a big concern of all of us. Those of us who aren't especially mechanically endowed would like some training in slide development.

The last point that we seem to concur on is that REC has an additional responsibility in terms of instructional programming. There should be more programs in more specific remediation skills, for example, over the developmental approach, let's say, of the Bank Street or of the Sullivan Linguistic approach. Other types of developmental programs should be developed by the company. There should be revision of the Sullivan program in terms of specific, unique populations. Sullivan should come encoded. Additional supplementary programs and materials are needed.

I will only editorialize on one point. A number of years back I was warned at a very good conference that educators had better make up their minds that if they aren't careful that we are going to turn education over to the manufacturer, and I sort of have the feeling that when we continuously ask the company to develop the program, are the educators taking the leadership or are we really losing the leadership that educators should really be initiating?

Chairman: Thank you Mr. Hirn. Now, here is Mrs. Kant.

Mrs. Thelma Kant: I covered the workshop on project management. Everyone agreed that we should try to utilize the ERE as fully as possible and schedule as many students as possible. However, in practice, we find that when an installation is small, the encoding time and programming time sometimes cut into the number of students who can be taken because the machine is needed for encoding.

It is possible to speed up programming and encoding time by doing encoding at one time and then going back and putting in the voice separately. This has proven in some installations to be very much more efficient than trying to do the two things at once. Additionally, it was brought out that it is not necessary always to use the same card voice for encoding. One installation has success with using a sort of dialogue; two voices were put on and you had the novelty of hearing two voices on your program.

Additionally, someone else found that it was effective to use the child's own voice when this was an individual program. The coding was put on and the child put his voice on. Then when he used the program this became more attractive for him, it was thought.

It may also be possible to use a tape recorder. Get the voice on the tape and with some sort of refinement in the sound it should be possible to get the voice from the tape on the card.

As to personnel needs, REC is happy and willing to give us leads on people who may be willing to have employment with the various installations, when the area is comfortable for the people they have interviewed. They have a film which you can use for orientation. They have people on their staff who are knowledgeable about funding, Titles One, Three and so forth, who will be happy to advise you administratively on where the money is coming from.

They have already indicated that in New York State the Department of Education has a program by which you may be able to get a research intern to help you if you don't have funds for personnel. This would have to be investigated further through REC or possibly through those who have tried this. Dr. Israel mentioned that point.

The handling of visitors in your project management - what do you do? One installation has worked up a video tape and finds this successful. Another one uses monitors for their visitors, never permitting them the actual contact with the booth and the child.

Everybody seems to agree that visitors should be seen by appointment only. Prepared statements which can be handed out when people come by and want to know the basic facts - can relieve some of your time.

The last thing that we discussed was the particular film that REC has which they will give you on loan, either in eight mm or 16 mm form, which can be used as an introduction for your visitors or for your staff, as the case may be. Miss Royds indicated that they are in the process now of making a film in England and we hope that will be available soon.

Chairman: Thank you Mrs. Kant, Mrs. Clary?

Mrs. Margaret Clary: I was to report on the workshops 3A and 3B - procedures for selection, observation and evaluation. As far as selecting children, there seem to be several methods. Many places use standardized reading tests such as the Metropolitan, Gates, and so on. Others have used this in combination with psychological test batteries. Teacher recommendations, which I think would be based on some type of standard reading test are used also. Committee recommendation are also used where, the teacher possibly in a public school setup, a principal, a vice principal, possibly a guidance person or so on might recommend children. Then, of course, if you are using the Sullivan material, there is a placement test available which many have used.

And in some installations, all of the children take part. As far as observation - some use close monitoring throughout the ERE session; some use it part of the time. Some have daily meetings with the ERE staff, the classroom teachers and so on. Some may have weekly meetings, but there needs to be some type of getting together so that they know whether they are observing properly. And in some cases they do use a checklist which not only is observing any educational or learning changes but also any social changes.

As far as evaluation, those that use standardized reading tests, in selecting their children, might be using other forms of the same test to evaluate the program after it's run for a while. Again, if the Sullivan material is being used, they do have definite progress tests and post-tests that may be used. They felt that any anecdotal records should be used as a means of evaluating also, which means that while we're observing we must keep an ongoing record, and this would be highlighted at the end by any type of post-test.

In the session yesterday afternoon, a report was presented on the Harlem Project - they have a criterion test of their own that they use at the beginning and the same test at the end. Of course, this is all dealing with young children. It would have to be before a reading test. I think those are the main points that came from our work group.

Chairman: Thank you, Mrs. Clary. Mrs. Taylor?

Mrs. Elizabeth Taylor: I covered the program methods in 4A and 4B, and at this point there are still a great many experiences being had in the process of working out effective material for the ERE. The need for the exchange of ideas and material is very obvious and has been stressed in previous meetings. While in a normal classroom setting for the slow learner, as for the emotionally disturbed child, the phonetic system is mostly in use, employing the Sullivan programs with a strong emphasis on audio-visual material introducing the letter and the sound to the child through the slide projector and key voice, employing the strategy of seeing, recognizing, and recalling.

And we should not overlook the benefit of repetition. Also using the visual aid, as mentioned in the case of demonstrating the use of prepositions to the child using objects that are familiar to him.

Another source of ideas is involving the child in the selection of programs by stimulating his interest, using field snapshots of himself and his surroundings, learning to identify objects such as numbers, coins, and so on. Here again, the use of the camera and the expandable keyboard is very important for the purpose of identifying and recalling. This was demonstrated by one educator using plastic keys inscribed with characters corresponding to the story program in coordination with the slide projector for recognizing and identifying.

A slip was handed to me and it notifies us that the ERE will have available by the end of this year approximately 120 programs. I did not cover the meeting of 4B, but again the question came up of interchanging materials and ideas. It is very important at this point because we are all in the experimental stage, and need to find a method which is the most effective way of handling the program so the child will have the most benefit from it.

Chairman: Thank you Miss Taylor. Mr. McPeek?

Mr. Ernest McPeek: It was generally agreed upon by everyone who attended the sessions on the related classroom that immediate follow-up, following the student's ERE booth experience, is absolutely necessary. The immediate follow-up should begin with the print-out sheet where the student is given an opportunity to review the work which he has just completed. The individual attention that goes along with this is also of utmost importance.

After the ERE session, the student should be given a copy of the print-out sheet to take with him back to the classroom. Too often the classroom teacher is not acquainted with what is being done in the ERE room. He may feel that the ERE machine is a threat to his own teaching.

The related classroom teacher should be an important person on the ERE program team. Several ways were mentioned whereby he could be involved.

He could review the print-out with the student. More important, he could help to formulate programs for the ERE machine, which would ultimately lead to the print-out. It was suggested that the classroom teacher's experience charts could provide a wealth of ideas for programming purposes. One person mentioned that the classroom teacher might be given loan of a 35 mm camera so that he could take pictures of classroom activities during holidays, plays, parties, field trips, etc. These pictures could be turned over to the ERE teacher for programming.

Many people indicated that other disciplines ought to be involved. This would include the speech therapist, the hearing clinician, the psychologist, etc.

Several different types of materials are being used in the related classroom. These include the Bell and Howell Language Master, the Sullivan Workbooks, the Bank Street Readers, and a series by Xerox Corporation entitled "The Way It Is."

Some classrooms have library sections. Students can return from the ERE situation and borrow books related to the lessons that they had just learned.

Certain follow-up games are being used. Just to mention a few: Anagrams, Old Maid, Rummy and Concentration. BRL is currently developing games related to the Sullivan materials. These will be made available in the near future.

Dr. Israel, from the Brooklyn Installation, mentioned that students were being allowed to take pictures and to help formulate and encode their own stories into programs. Some of this type of activity could certainly be initiated in the related classroom.

Another person reported that they had involved their students in regular typing classes following the ERE session. These classes had been highly successful.

Chairman: Thank you very much Mr. McPeek. Richard?

Mr. Richard Kobler: Yes. I'm being prompted. Some of you may have heard rumors - has there been any announcement about the Fourth model of the ERE? No, there hasn't been? There has been? All right. And do you know the story about conversions? All you need is money, and we'll be happy to help you. Well, the two and a half and the three and a half that you're talking about are actually the major new capacities of the ERE form. The new instrument makes possible to program into your program such a shift into a series of dictation modes in which you can either encode the keyboard to coincide with the voice commands or instructions to inform and hold the youngster to the completion correct response, or you can move to a second phase in which you give them dictation and in which you ask them to type that which they're hearing, and the machine is free to accept error into the keyboard in response to the verbal response.

Dr. John Henry Martin: I think this is the kind of thing that Dr. [illegible] has done on a manual manipulation of putting the machine into the free type and then using the interface of the touch attachment into the child. This can now be programmed in, you see, in the 1500, and we expect our full delivery of machines to be all in that time. These machines that you're specifying will be [illegible] connected when you can contract for the amount of money that's involved. I recall it's about $1,875.

A very quick reaction to a number of the points made here on the association and the exchange of information. I think as a company we will undertake to set up some type of national organization for a kind of association exchange among yourselves. I think the company would take the obligation of providing you with the secretarial, clerical, editorial help to collate materials coming in and running them off in effect on a duplicating machine and distributing them, provided you as a group would take the responsibility for the editorial content.

I think we share Mr. [illegible]'s sensitivity even more acutely than his very gentle way of expressing the role of the corporation in education. And we are extremely sensitive that we do not command you, dictate to you, direct you. In effect, we are deeply committed to a fundamentally service proposition. May I say as a soft aside to [illegible] as such, our textbooks, you know, are published by commercial organizations. And some of our sensitivity about software and courseware programs is a little bit amusing. For the alternative to both those, and the alternative to no programs on the 1500, sometimes can be dignified by being called experimental.

But sometimes in our own family behind closed doors, we find the [illegible] is something less than the beginning of wisdom. To your question about audio from a tape, the answer is, this is presently [illegible] with the technical process that we're using, completely encoded with voice and code, for those standardized programs that you procure from us.

[illegible]

[illegible]: [illegible]

[illegible]: [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

immediate direction is the tactile, kinesthetic reproduction of the vocabulary that was involved in that lesson that day.

He has been typewriting; he now needs to manually write. This is a total bodily gestalt of an integration of what otherwise remains a neurological sensory function; getting it into the musculature is an important way of getting it in and getting a cohesion of the process.

I want to thank you all and everyone who has participated. We are delighted that you are here for our very first endeavor of this sort. I am pleased to have you think that you would like to have others.

We will have a problem in budget if we run them too quickly, but we will have another, and we are very happy to have had you as guests. Thank you very much.

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